Appendix C — Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/W.17/WY7403bo

December 1, 2003

Mr. Bert McCauley, P.E.
Project Manager
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street, Room 259
Lakewood, CO 80228

Dear Mr. McCauley:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the proposed reconstruction project on Segment 4 of U.S. 212 also known as the Beartooth Highway in Park County, Wyoming and its effects on the grizzly bear (*Ursus arctos horribilis*), bald eagle (*Haliaeetus leucocephalus*), Canada lynx (*Lynx canadensis*), and the gray wolf (*Canis lupus*) in accordance with the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your June 11, 2003, request for formal consultation was received on June 13.

This Biological Opinion is based on information provided in the June 2003 Biological Assessment; a June 11, 2003, letter from the Federal Highway Administration (FHWA) initiating formal consultation; and additional information as described below under Consultation History. A complete administrative record of this consultation is on file at the Service's Wyoming Field Office in Cheyenne, Wyoming.

CONSULTATION HISTORY

Informal consultation on the proposed reconstruction action began in 1998 with an initial letter from the FHWA (dated 02/05/98) to the Service requesting threatened and endangered species information in the project area. The Service agreed to participate as a cooperating agency for the proposed project in a letter to FHWA dated November 18, 1998. Informal consultation was continued by a series of meetings, site reviews, and correspondence between the Service and the FHWA. Additionally, the consultation history for this project includes the following correspondence: August 17, 1998, letter from FHWA providing information regarding proposed reconstruction activities on Segment 4 of U.S. 212; June 27, 2001, letter from FHWA to the Service requesting updated species information; July 13, 2001, letter from the Service providing

updated species information; September 10, 2001, Preliminary Draft Environmental Impact Statement (EIS) containing species impact information submitted to the Service for review and comment; November 15, 2001, plan and profiles for the road segment that extends through the Beartooth Ravine were submitted to the Service to determine whether the road maintains Canada lynx habitat connectivity; January 8, 2002, the Service provided comments on the plan and profiles regarding maintenance of Canada lynx habitat connectivity; January 11, 2002, the second Preliminary Draft EIS containing species impact information was submitted to the Service for review and comment; March 5, 2002, letter to the Service requesting an updated species list; March 8, 2002, the Biological Assessment outline was submitted to the Service; June 14, 2002, the Draft EIS containing species impact information was released for comment; June 24, 2002, the Draft Biological Assessment was submitted to the Service; October 25, 2002, letter from the Service to FHWA commenting on the Draft EIS; February 5, 2003, project update letter sent to the Service; March 5, 2003, project update letter was sent to the Service; April 28, 2003, project documents were submitted to the Service per our April 22, 2003, request; June 11, 2003, final Biological Assessment was submitted to the Service; and August 22, 2003, an errata sheet for the Biological Assessment was submitted to the Service.

Also, the consultation history includes the following meetings and field reviews: March 16, 1999, a Social, Economic, and Environmental (SEE)/Interagency Team meeting; June 16-18, 1999, field review; September 8-9, 1999, SEE/Interagency Team meeting; May 2, 2000, SEE/Interagency Team meeting; July 11-12, 2000, field review; August 7-11, 2000, field review; August 11, 2000, SEE/Interagency Team meeting; September 20, 2000, Interagency meeting regarding Grizzly bear concerns; January 30, 2002, SEE/Interagency Team meeting; May 21, 2002, conference call regarding the Biological Assessment; July 9, 2002, Interagency meeting to discuss the Draft Biological Assessment; August 26, 2002, field review to identify Wildlife Crossing Assessment Area of concern for Federally-listed species within the proposed project limits; September 19, 2002, SEE/Interagency Team meeting; April 17, 2003, Interagency meeting; April 28, 2003, Interagency meeting; June 4, 2003, Interagency meeting; July 8, 2003, SEE/Interagency meeting; August 27, 2003, SEE/Interagency Team field review to refine design for Wildlife Crossings; and a November 3, 2003, Interagency meeting.

Additionally, on June 13, 2003, the Service received a letter and a Biological Assessment from the FHWA requesting initiation of formal consultation. The Service responded with a letter to the FHWA dated July 1, 2003, indicating a complete consultation package had been received and that formal consultation was initiated with the Service on June 13.

Other Listed Species

In the June 2003 Biological Assessment, the FHWA determined that the effects of the project, as proposed, were not likely to adversely affect the bald eagle and would not likely jeopardize the continued existence of the gray wolf. No bald eagle nests or roosts have been documented within one-mile of the proposed project area. Suitable bald eagle nesting habitat is not found in the vicinity of the project area. Distribution records from the Wyoming Game and Fish Department (1999) state that the bald eagle has been observed in the project area, but there was no evidence of reproduction or nesting. Based on this information, and as indicated in the 2003 Biological Assessment, eagle occurrence within the project area is assumed to be limited to occasional migration.

The Beartooth Pack currently is the closest gray wolf pack to the project area, frequenting the area north and south of the Beartooth Highway in Wyoming. In late 2002, the Beartooth Pack consisted of four adults and three pups (USFWS et al. 2003). A year-round prey base is not available in the project area, as ungulates do not over-winter due to harsh winter conditions. The proposed project is not expected to negatively impact ungulate populations that gray wolves may hunt. While suitable denning and rendezvous sites may be present in areas adjoining the project area, they are unlikely to occur near Segment 4 of the Beartooth Highway and other areas of concentrated human activity, including backcountry roads and trails, and campgrounds. No decrease in gray wolf reproductive fitness is expected as a result of impacts to prey species from the proposed project. The entire project area consists of lands managed and maintained by the U.S. Forest Service, Shoshone National Forest (SNF). Currently, wolves occurring on U.S. Forest Service lands in Wyoming are treated as proposed species rather than threatened. It is anticipated that those Conservation Measures implemented for the grizzly bear and the Canada lynx as a feature of the proposed project (listed under "Description of Proposed Action") will also benefit the gray wolf.

The Service concurs with your determination that the project, as proposed, will not adversely affect the bald eagle and will not jeopardize the continued existence of the gray wolf. Therefore, these species will not be discussed further in this Biological Opinion.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The proposed action has been separated into three sections (Roadway Reconstruction, Wildlife Crossing Areas, and Workcamp Construction) for clarification purposes in this Biological Opinion.

Roadway Reconstruction

In accordance with the guidelines adopted by the FHWA (as required by FHWA's regulations 23CFR 625) and the Wyoming Department of Transportation (WYDOT), the FHWA in cooperation with the National Park Service (NPS) and the SNF, proposes to reconstruct a 30-kilometer (km) (18 miles (mi)) portion of U.S. 212 in Park County, Wyoming. The proposed project will begin at Kilometer Post (KP) 39.5, just west of the Clay Butte Lookout turnoff, traverse east over Beartooth Pass, and end at the Montana/Wyoming state line at KP 69.4. This section of the Beartooth Highway (U.S. Hwy 212) is referred to as Segment 4. In Wyoming, portions of the Beartooth Highway have been designated as an All-American Road under FHWA's Scenic Byway Program. Reconstructing the road will improve its deteriorating condition, safely accommodate current and projected recreational use, allow the SNF to continue to manage activities along the road, and enhance recreation and scenic values.

The Beartooth Highway is recognized as an important transportation route between Red Lodge, Montana and Yellowstone National Park (YNP). The Beartooth Highway was originally constructed as a Park Approach Road in the 1930s to provide access to YNP from Red Lodge. Executive Order 5949, signed by President Hoover in 1932, withdrew lands lying within 250 feet on each side of the center line of the Beartooth Highway from settlement, location, sale, entry, or other disposal. Currently, Segment 4 of the Beartooth Highway no longer safely accommodates

current vehicle types, such as recreational vehicles or pickup trucks with trailers. Reconstruction will address seven primary deteriorating or deficient elements that contribute to safety concerns of the existing road: roadway surface; road alignment; travel lane width; shoulder width; bridges; drainage facilities; and parking areas, pullouts, and access road intersections.

The majority of the reconstruction will be along the existing road corridor of Segment 4 with an overall objective of an improved roadway alignment, grade, and width. Segment 4 currently consists of two 2.75 meter (m) (9-foot (ft)) wide travel lanes for a total width of about 5.5 m (18 ft). Currently, in most locations, there is little or no shoulder. The proposed action will result in a reconstructed roadway with a width of 9.0 m (30 ft), 8.4 m (28 ft), or 9.6 m (32 ft) depending on location. The total roadway width will be 9.6 m (32 ft) from the start of the project to the Clay Butte Lookout turnoff, 9.0 m (30 ft) from the turnoff to the road closure gate, and 8.4 m (28 ft) from the road closure gate to the end of the project.

Due to existing and expected traffic that is greater than 6.0 m (20 ft) in length (e.g., motor homes, buses, vehicles hauling trailers) a travel lane width of 3.6 m (12 ft) was selected for Segment 4. The transition area from project start to the Clay Butte Lookout turnoff will have a 1.2 m (4 ft) shoulder. From the Clay Butte Lookout turnoff to the road closure gate, the shoulder will be 0.9 m (3 ft) wide. For the remaining part of the project (road closure gate east to the Montana/ Wyoming state line), the shoulder will be 0.6 m (2 ft) wide. An area cleared of trees and larger rocks, called a clear zone, will be maintained in all areas. The clear zone will be approximately 3 m (10 ft) from the white stripe at the edge of the travel lane.

The proposed alignment will closely follow the existing alignment throughout most of the project, with the exception of three realignment locations. At the Top of the World store, the preferred alignment will depart from the existing alignment 0.7 km (0.4 mi) west of the Top of the World store, head south and then east of the existing alignment, crossing Little Bear Creek and the existing alignment near the existing bridge west of the Top of the World store. East of the bridge, the new road will pass the Top of the World store 15 to 20 m (50 to 65 ft) north of the existing alignment. The roadway will then curve south, crossing Little Bear Creek a second time. From the second bridge crossing, the new alignment will curve once more north of the existing alignment, and return to the existing alignment east of the road to Island Lake Campground. At the eastern end of the project area, the existing switchbacks will have new curves with slightly larger radii. Curve widening will occur at specific locations on the project, with most widening being applied on the inside of the curve. The centerline will be shifted from its current alignment in certain locations. A design speed of 60 km/hour (h) (37 miles per hour (mph)) was selected for the western segment (KP 39.4 to KP 49.3), and a design speed of 50 km/h (31 mph) was selected for the eastern segment (KP 49.3 to KP 69.4).

The proposed project will include the removal of four existing bridges and the construction of six new bridges with curb to curb width of 11 m (36 ft). At Beartooth Ravine, a new bridge with a design speed of 55 km/h (34 mph) will be constructed. Approximately 450 m (1500 ft) of retaining wall section will be required east of the Beartooth Ravine bridge. The piers for the Beartooth Ravine bridge will be constructed in the talus slopes south of the existing road. One new bridge will be constructed at the Beartooth Lake outlet, two new bridges will be constructed at two locations crossing Little Bear Creek (including a new bridge at the Little Bear Creek fen roadway crossing), and one new bridge will be constructed at the Long Lake outlet. Retaining walls will be used on both sides of the new Long Lake bridge to eliminate or reduce the amount

of fill necessary to support the bridge and to reduce impacts to existing wetlands. The bridge at the Beartooth Lake outlet, the two crossings of Little Bear Creek, the Little Bear Lake Fen bridge, and the Long Lake outlet will be in the same general locations as the existing roadway, but the alignment will be slightly different to accommodate the new bridge construction while permitting passage of traffic during reconstruction. All bridges except the Beartooth Ravine bridge and the Little Bear Lake Fen bridge will be single span bridges, constructed without the use of piers. In addition, existing culverts will be replaced and new culverts will be added along Segment 4.

Unpaved graded ditches will be reconstructed over half of Segment 4. Unpaved ditches will be 1.8 m (6 ft) wide beyond the surfaced foreslope on a slope of 1:6. Paved ditches generally will be used at locations where they currently exist, where there is existing evidence of ditch erosion problems, or to minimize environmental impact. Paved ditches will be 1.5 m (5 ft) wide beyond the roadway shoulder on a slope of 1:8 to 1:10. Foreslope construction will be required in all areas without a paved ditch. In the typical section, the foreslope will be 2.4 m (8 ft) wide, with a varying slope ratio. Guardrails and retaining walls will be used at selected locations where warranted. Guardrails will be placed 0.6 m (2 ft) from the shoulder's edge. In guardrail areas, a steeper foreslope (1:2) is proposed because a barrier (guardrail) will prevent errant vehicles from leaving the road.

The proposed project will also include the reconstruction of major intersections along Segment 4 in order to accommodate the new road grade. In the current design for the first phase of the project, new road intersections will be built at the following nine locations: Clay Butte Road intersection, Beartooth Campground Road intersection, two intersections at the Top of the World Store, Island Lake Campground Road intersection, Forest Road 149 intersection, intersection at Station 49+154, Forest Road 151 intersection, and Forest Road 120 intersection. Reconstruction of major intersections along the second phase (eastern portion) of the project have yet to be identified. As these intersections are identified, this information will be provided to the Service.

Segment 4 currently has 114 existing pullouts and parking areas. Forty-nine undersized pullouts and parking areas are proposed to be eliminated during final construction design. Except at realignment areas, the disturbed areas from existing pullouts will be incorporated into the reconstructed roadway. The proposed project will incorporate a total of 65 pullouts along the reconstructed roadway. FHWA states that the size, number, and location of pullouts may be modified during final design in cooperation with the SNF and other resource agencies. Larger pullouts and interpretive sites with pull-in parking will be built at the following ten locations: Beartooth Ravine (KP 41.3), Frozen Lake (KP 53.3), Dead Man's Curve (KP 58.4), West Summit Switchbacks (KP 58.8), West Summit Rest Area (KP 59.2), Bar Drift (KP 61.1), Gardner Lake/National Recreation Trail (KP 62.1), East Summit/Red Lodge Race Camp (KP 64.2), Upper Albright Curve (KP 68.6), and Lower Albright Curve (KP 68.0).

Interpretive exhibits will be provided at some locations (i.e., Beartooth Lake Trail) to alert the public to the presence of wildlife, effects of human activity on wildlife, and the potential for wildlife/vehicle collisions. Signs alerting visitors to wildlife crossings will be placed near Stations 39+500 and 42+580. Advisory speed plates will be used on wildlife crossing signs to advise the public of the recommended operating speed. Design exception areas will be marked with warning and advisory speed signs. All warning and advisory signs will be placed 40 m (131 ft) in advance of design speed exception areas.

In some locations where rock is present, (e.g., Beartooth Ravine, the rocky area near Island Lake at the Top of the World Store area, and near Frozen Lake) rock blasting will be required to provide the necessary grade and alignment. Some rock outcrops will be drilled at night, but nighttime blasting will not be permitted. Blasting will begin during the spring shoulder season (April to May) and will continue through the summer. The fall shoulder season (September to October) will have limited blasting to minimize impacts to wildlife that are more active during the fall. Material from all blasting areas will be hauled to the Ghost Creek materials source site or the Island Lake Moraine materials processing site for crushing and asphalt production.

The existing asphalt surface will be removed and reused as sub-base material in the reconstructed road. In most locations, the existing fill will remain, and additional fill will be brought from excavated areas. Additional material may be generated from previously used material sources sites located on SNF lands outside of the roadway reconstruction area.

Two materials source sites may be needed during project construction. A site at Ghost Creek, located about 4 km (2.5 mi) west of the project area on Forest Service Road 118, will be the primary materials source site. Based on preliminary analysis, the FHWA estimates an area up to 11 hectares (ha) (28 acres (ac)) of materials will be needed from the Ghost Creek site for roadway reconstruction activities. Additional analysis regarding quantity and quality of rock will determine the final disturbance area. Excavation at the Ghost Creek site will remove the material east of the existing access road to a grade similar to the road. Approximately two months of crushing activities at the Ghost Creek material source site will produce all the aggregate needed for portions one and two of the first phase of the project (crushing for each portion will require about one month). Crushing operations will take place approximately early to mid-summer. A second materials site is located south of the road at the Island Lake Campground entrance (KP 46.7). An area up to 1 ha (3 ac) will be used from the Island Lake Campground site if materials from the Ghost Creek site are found to be inadequate. Island Lake Campground is a large glacial moraine, and will be excavated to match the existing grades north and south of the moraine. At both material source sites, topsoil will be windrowed along the clearing limits and replaced on completed cut and fill slopes once earthwork operations are completed. Both material source sites will be re-vegetated prior to completion of the proposed project. Unsuitable rock material not used in embankment areas, aggregate base, or asphalt will be disposed of through piling and covering at Ghost Creek. Other additional locations for material sources or unsuitable material disposal may be identified during final design, with approval from the SNF and the Service.

The Ghost Creek material source site will also be used as a staging area for equipment, personnel, and aggregate and asphalt production. In addition, four existing disturbed areas have been tentatively identified as staging areas for equipment, personnel, and materials. Additional staging areas may be identified during final design in consultation with the SNF. Any additional staging areas needed will be submitted to the Service as part of the final design package. The four existing disturbed areas identified are an area south of Top of the World store, an area near the Sawtooth Lake jeep trail/Beartooth Highway intersection, an area near Forest Road 151 west of Long Lake, and an area at the West Summit. Staging areas not subsequently used as roads or pullouts will be reclaimed after they are no longer needed for construction purposes. Prior to commencement of construction activities, the entrance to Forest Road 151 and the West Summit loop road will be paved. In addition, truck turnaround areas will be limited to the proposed areas

of disturbance. No additional disturbance will occur to create specific truck turnaround areas. Truck hauling will occur during the entire construction season with approximately 200 roundtrips per day.

Segment 4 road reconstruction is currently scheduled to begin in 2005 and last for approximately 6 years. The reconstruction will occur in two phases. Phase I will be from the project start to the road closure gate (Station 52+400). Construction in the wildlife crossing assessment areas will take place in the first construction season during Phase I. Phase II will be from the road closure gate (Station 52+400) to the project end (Station 69+100). Construction of Phase I and Phase II will require three construction seasons each. The construction season will be from approximately April through October. Paving operations will probably occur during the last construction season of Phase I and Phase II. Construction will begin as early as possible in the spring. Limited nighttime construction will occur after September 1.

According to the June 2003 Biological Assessment, the FHWA has committed to providing the following additional project features as a result of proposed roadway reconstruction activities: (1) the Beartooth Ravine area will receive special re-vegetation efforts to increase cover outside of the clear zone; (2) unpaved ditches will be constructed of native soil material; (3) roadway designs will preserve as many large trees on the edge of disturbance as possible; (4) in locations where fish passage is important, culverts will be designed and placed to maintain fish passage; (5) in abandoned road sections, the road will be removed and the area regraded and re-vegetated with non-palatable native species to create habitat similar to adjacent undisturbed lands; (6) at all bridge locations except the Beartooth Ravine bridge and the Little Bear Lake Fen bridge, riprap will be used to protect stream banks; (7) in areas where the road will be reconstructed or widened in undisturbed locations, surface soils will be salvaged and windrowed for subsequent use in reclamation; (8) soils typically will be placed on the disturbed cuts and fills during the same season; (9) disturbed areas will be re-vegetated with species similar to those found in undisturbed areas; and (10) trees will be planted in disturbed areas that currently are forested.

Wildlife Crossing Areas

The FHWA, in conjunction with other agencies, has identified seven Wildlife Crossing Areas along the western portion of Segment 4 for which site-specific landscape plans have been developed. These Wildlife Crossing Areas are described below. Any changes to the landscape plans described below will be coordinated with the SNF and the Service to determine the potential for providing an improved plan.

Wildlife Crossing Area 1 is from approximately Station 39+800 to Station 39+820. Neither curve widening nor guardrail will be required at this location. The average clearing width based on a cross section review for this area will be approximately 25.3 m (83 ft). Minor blasting will occur in the surrounding area to remove large boulders, but no major blasting for rock outcrop areas will be necessary within this crossing. No parking areas or pullouts will be located at this crossing and the proposed centerline will closely match the existing centerline at this location. The area will be re-seeded with the rocky seed mix for elevations below 2,838 m (9,311 ft). Four Engelmann spruce (*Picea engelmannii*), four lodgepole pine (*Pinus contorta*), three buffaloberry (*Shepherdia canadensis*), one raspberry (*Rubus ideaus*), and two common juniper (*Juniperus communis*) will be planted at this crossing. Downed logs and rocks also will be placed on approximate 4.6 m (15 ft) centers in the disturbed area within the wildlife crossing.

Wildlife Crossing Area 2 is approximately Station 40+320. Neither curve widening nor guardrail will be required at this location. The average clearing width based on a cross section review for this area will be approximately 29 m (96 ft). Minor blasting will occur in the surrounding area to remove large boulders. Major blasting for rock outcrop areas will occur at Station 40+350 to Station 40+500. No parking areas or pullouts will be located at this crossing and the proposed centerline at this crossing will be shifted to the left. Both sides of the road as well as areas adjoining wildlife crossing area 2 will be seeded with the riparian seed mix. In addition, three willows (*Salix* spp.) salvaged from areas disturbed during construction will be transplanted in the wildlife crossing area. Willow cuttings will be placed along the right side of the reconstructed highway on approximate 4.6 m (15 ft) centers.

Wildlife Crossing Area 3 is from approximately Station 40+520 to Station 40+750. The average clearing width based on a cross section review for this area will be approximately 30 m (99 ft). Curve widening will not be necessary at this location. Minor blasting will occur in the surrounding area to remove large boulders, but no major blasting for rock outcrop areas have been identified near this crossing. A pullout will be located on the right side from Station 40+510 to Station 40+570. The centerline from Station 40+260 to Station 40+700 will be shifted to the left, and from Station 40+700 to Station 40+900 the centerline will be shifted to the right. A guardrail will be located on the right side from Station 40+710 to Station 40+750 in the wildlife crossing area, and a gap in the guardrail has been included from Station 40+750 to Station 40+770 to facilitate animal passage. In addition, animal-friendly designs, such as WYDOT Box Beam guardrail, will be used to increase animal sight lines and minimize snow drifting if gap cannot be provided. The mesic seed mix for elevations below 2,838 m (9,311 ft) and rocky seed mix for the same elevation range will be used at this wildlife crossing. For the easternmost crossing, two Engelmann spruce and one lodgepole pine will be planted on the right side of the reconstructed highway and two Engelmann spruce and one lodgepole pine will be planted on the left side of the reconstructed highway. At the westernmost crossing, two lodgepole pines and one Engelmann spruce will be planted on the left side of the road, and one lodgepole pine and one Engelmann spruce will be planted on the right side of the road. At the middle crossing in this area, four lodgepole pines will be planted on the left side of the road, and two Engelmann spruce will be planted on the right side. Downed logs and rocks will also be placed on approximate 4.6 m (15 ft) centers in an area around the wildlife crossing.

Wildlife Crossing Area 4 is from approximately Station 40+960 to Station 41+060. The right side will have a fill slope of 1:2. The left side will transition from a paved ditch with a 1:20 fill slope for the first 20 m (66 ft) of the roadway for this crossing area to a graded ditch with a 1:3 back slope for 40 m (131 ft) to a 1:3 sill slope for 40 m (131 ft). The average clearing width based on a cross section review for this area will be approximately 29 m (96 ft). Curve widening will not be necessary at this location. Minor blasting will occur in the surrounding area to remove large boulders, and no major blasting for rock outcrop areas has been identified near this crossing. No parking areas or pullouts will be located in this crossing area, however, a pullout will be located just east of this wildlife crossing area at Station 41+100. From Station 40+900 to Station 41+025, the centerline will be shifted to the right. Guardrail throughout this wildlife crossing area will be necessary due to the fill slope of 1:2 on the right side. However, a gap in the guardrail has been included from Station 40+920 to Station 41+060 to facilitate animal passage. In addition, wildlife-friendly designs, such as WYDOT Box Berm guardrail, will be used to increase animal sight lines and minimize snow drifting if no gap can be provided. At the eastern crossing, the mesic seed mix will be used, and two Engelmann spruce will be planted on

the right side of the reconstructed highway. At the western crossing area, the mesic seed mix will be used, and two lodgepole pine and one Engelmann spruce will be planted on the left side of the reconstructed highway. On the right side of the highway at the western crossing area, two Engelmann spruce will be planted. Downed logs and rocks also will be placed on approximate 4.6 m (15 ft) centers in an area around each crossing.

Wildlife Crossing Area 5 is from approximately Station 41+180 to Station 41+220. The right side will have a fill slope of 1:2 and the left side will have a 1:4 fill slope. The average clearing width based on a cross section review for this area will be approximately 35 m (114.7 ft). Curve widening of 1 meter on the inside of the curve (right side) will be necessary from Station 41+118 to Station 41+239. Minor blasting will occur in the surrounding area to remove large boulders, and major blasting for a rock outcrop will occur east of the wildlife crossing from Station 41+260 to Station 41+400. No parking areas or pullouts will be located at this crossing, and the centerline will be shifted to the right. Guardrail through this wildlife crossing will be necessary due to the fill slope of 1:2 on the right side. However, a gap in the guardrail has been included from Station 41+118 to Station 41+280 to facilitate animal passage. Wildlife friendly designs, such as WYDOT Box Beam guardrail, will be used to increase animal sight lines and minimize snow drifting if no gap in the guardrail can be provided at this location. The mesic seed mix will be used on the right side of the reconstructed highway and plantings will include three lodgepole pine. On the left side of the reconstructed highway, the rocky seed mix will be used and plantings will include four Engelmann spruce and two lodgepole pine. Downed logs and rocks will also be placed on approximate 4.6 m (15 ft) centers in an area about 250 squared meters (2,700 squared feet) around the wildlife crossing.

Wildlife Crossing Area 6 is from approximately Station 41+420 to Station 41+480, also known as the Beartooth Ravine. A bridge will span this crossing. Blasting will occur near this location from Station 41+260 to Station 41+400, and from Station 41+500 to Station 41+620. The centerline will be slightly shifted in this location. The rocky seed mix will be used at this crossing. In addition, five lodgepole pines, two raspberry trees, and two buffaloberries will be planted at this wildlife crossing area. Downed logs and rocks also will be placed on approximate 4.6 m (15 ft) centers, and additional trees and shrubs will be planted in the reclaimed abandoned road segment.

Wildlife Crossing Area 7 is from approximately Station 42+080 to Station 42+160. The fill slope on the right side will be 1:3 and on the left side the fill slope will transition from 1:4 to 1:3. The average clearing width based on a cross section review for this area will be approximately 31 m (103 ft) to achieve 1:3 fill slopes and avoid use of guardrails. Curve widening will not be necessary at this location. Blasting will occur near this location from Station 41+960 to Station 42+060 and minor blasting will occur in the surrounding area to remove large boulders. No parking areas or pullouts will be located at this crossing. From Station 41+980 to Station 42+100, the centerline will be shifted to the left, and from Station 42+100 to Station 42+335, the centerline will be shifted to the right. Guardrail is currently not proposed through this wildlife crossing area. Both sides of the road will be seeded with the riparian seed mix. In addition, two willows salvaged from areas disturbed during construction will be transplanted on the north side of the reconstructed highway, and three willows will be transplanted on the south side of the reconstructed highway at this location. Willow cuttings will be placed along the southern side of the reconstructed highway on approximate 4.6 m (15 ft) centers.

Workcamp Construction

The proposed project also includes the expansion of the Fox Creek Campground by 6 campsites, from an existing total of 27 campsites to a proposed total of 33 campsites. The campground will be closed to the public during the 6-year construction period. The campground will be rebuilt to current standards during 2004, and construction crews will begin utilizing the campground in 2005. The campground will be modified to accommodate recreational vehicles and trailers with a "pod" design concept. The expansion will occur within the footprint of the existing Fox Creek Campground area. Disturbance outside the existing campground footprint will not occur. Surface disturbance and tree clearing within the existing footprint will be required to provide for additional trailer pads and to improve air circulation throughout the campground. The existing surface water distribution system will be abandoned and a new well water system will be constructed. Permanent potable water and toilet facilities will be added to the campground. A semi-permanent communal shower, laundry, and cooking facilities may also be provided for contractor use during the duration of the construction project. In addition, electrical power will be provided from the nearby Cooke City, Montana power line.

Conservation Measures

In an effort to be proactive in protecting the grizzly bear, Canada lynx, and their associated habitats with regard to the proposed highway reconstruction activities, the FHWA has committed to certain Conservation Measures (CM), as identified in the June 2003 Biological Assessment, to minimize impacts during construction and provide enhanced habitat after reclamation of the disturbed area. These measures are attached to this Biological Opinion and are referenced as Attachment A.

STATUS OF THE SPECIES

Grizzly Bear

Status and Distribution

The grizzly bear was listed as a threatened species on July 28, 1975. Between 1850 and 1950, grizzly bears were extirpated from approximately 98 percent of their historic range in the contiguous U.S. by human-caused mortality (USFWS 1993), reducing the grizzly population to roughly two percent of its former range. Historically, the grizzly bear ranged from the Great Plains to the Pacific, and from the northern U.S. border with Canada to the southern border with Mexico. Currently, the grizzly bear occupies parts of British Columbia and Alberta in Canada, and Montana, Idaho, Wyoming, Washington, and Alaska in the U.S. Only five, or perhaps six, areas remain in portions of Washington, Idaho, Montana, and Wyoming that support small self-perpetuating or remnant populations of grizzly bears. The estimated total population of grizzly bears stands at 800 to 1,000 individuals (USFWS 1993). The exact size of the grizzly bear population in the Yellowstone Grizzly Bear Ecosystem (YGBE) is unknown, as the reclusive nature of the species and the rugged terrain it inhabits makes any census extremely difficult. Eberhardt et al. (1994) evaluated population trends based on reproductive and survival rates and estimated a rate of increase of 4.6 percent annually of the grizzly bear population in the YGBE since the mid to late 1980's. Absolute minimum populations estimates for grizzly bears in the YGBE based on counts of adult females with cubs-of-the-year, have increased from a low of 99 bears in 1979 (Haroldson et al. 1998), to a high of 354 bears in 2000 (Haroldson and Frey 2001).

Conservation Mechanisms

In an effort to facilitate consistency in the management of grizzly bear habitat within and across ecosystems, the Interagency Grizzly Bear Guidelines were developed by the Interagency Grizzly Bear Committee (IGBC) for use by land managers (IGBC 1986). The IGBC developed specific land management guidelines for use in each of the five ecosystems including the YGBE. The YGBE includes 23,300 sq km (9,210 sq mi) primarily within Yellowstone and Grand Teton National Parks; John D. Rockefeller Memorial Parkway; Bridger-Teton, Shoshone, Targhee, Gallatin, Beaverhead, and Custer National Forests; private and State lands; and lands managed by the Bureau of Land Management.

Recovery zones also have been established for the grizzly bear and include areas large enough and of sufficient habitat quality to support a recovered bear population. According to the Grizzly Bear Recovery Plan (GBRP), a recovery zone is defined as that area in each grizzly bear ecosystem within which the population and habitat criteria for achievement of recovery will be measured (USFWS 1993). Areas outside of recovery zones may provide habitat that grizzly bears will use, but are not considered necessary for the survival and recovery of this species. The area outside the recovery zone but within the 10-mile buffer area, is managed to consider and protect grizzlies and their habitat whenever possible. Population and mortality data within this buffer are collected and remain pertinent to recovery criteria (USFWS 1993). Beyond the 10-mile buffer, grizzly bear mortalities or populations are not considered when determining whether recovery goals have been met.

In 1994, all population recovery parameters were achieved for the first time. However, grizzly bear mortality limits were exceeded during the next three years (1995 through 1997). All population recovery parameters were achieved again from 1998 through 2001. A conservation strategy has been completed for the grizzly bear. Habitat-based recovery criteria and State management plans are currently being developed for the grizzly bear. When completed, the Service will likely consider removing Yellowstone ecosystem grizzly bears from threatened species status.

The Yellowstone Grizzly Bear Recovery Zone (Recovery Zone) covers approximately 5,438,000 acres of primarily NPS and National Forest Service (NFS) lands, roughly 89 percent of the currently known distribution of the grizzly bears in the YGBE. YNP contains nearly 40 percent of the Recovery Zone for the YGBE grizzly bear population. Grizzly bears also occur in and use areas outside the Recovery Zone. Areas within the Recovery Zone are stratified into Management Situation Zones 1, 2, or 3; each having a specific management direction.

> **Management Situation 1** (MS1): lands contain population centers of grizzlies, are key to the survival of the species, and are where management decisions will favor the needs of the bear even when other land use values compete.
>
> **Management Situation 2** (MS2): lands are those areas that lack distinct population centers and the need for this habitat for survival of the grizzly bear is more uncertain. The status of such lands is subject to review. Here, management will at least maintain those habitat conditions that resulted in the area being classified as MS2.

Management Situation 3 (MS3): designation is intended for lands where grizzly bears may occur infrequently. There is high probability that Federal activities here may affect the species survival and recovery. Management focus is on human-bear conflict minimization, rather than habitat maintenance and protection.

Recovery zones are divided into smaller areas called Bear Management Units (BMUs) for the purpose of habitat evaluation and monitoring. BMUs were designed to:

(1) assess the effects of existing and proposed activities on grizzly bear habitat without having the effects diluted by consideration of too large an area;

(2) address unique habitat characteristics and bear activity and use patterns;

(3) identify contiguous complexes of habitat which meet year-long needs of the grizzly bear; and,

(4) establish priorities for areas where land use management needs would require cumulative effect assessments.

The current GBRP outlines recovery strategies for the various grizzly bear ecosystems (USFWS 1993). This plan defines a recovered population as one that can sustain the existing level of known and unknown human-caused mortality that exists in the ecosystem and is well-distributed throughout the Recovery Zone. Demographic recovery criteria outlined for the Yellowstone Recovery Zone include:

(1) observation of 15 females with cubs-of-the-year annually (unduplicated sightings) over a 6-year running average;

(2) occupation of 16 of the 18 BMUs by females with young from a running 6-year sum of verified observations, and no two adjacent BMUs unoccupied;

(3) known human-caused mortality not to exceed 4 percent of the current minimum population estimate (based on most recent 3-year sum of females with young); with no more than 30 percent of this total mortality limit of 4 percent by females; and,

(4) these mortality limits cannot be exceeded during any 2 consecutive years.

In addition, the existence of adequate regulatory mechanisms for population and habitat management through the development of a conservation strategy must also be demonstrated.

Based on population monitoring, data indicate an average of over 27 females with cubs for the period of 1993 through 2000. Females with cubs occupied 16 of the 18 BMUs during 1988 through 1991, 17 of the 18 BMUs were occupied during 1994 through 1996, and all 18 BMUs were occupied from 1998 through 2001. Until 1995, the 6-year average known human-caused mortality had averaged less than 4 percent of the current population estimate and less than 30 percent of this mortality had been females. However, during 1995 there were 17 known human-caused grizzly bear mortalities in the Yellowstone ecosystem including 7 known human-caused

female mortalities. Since this time, human-caused mortality and female mortality have declined. The 6-year running average of known human-caused mortality calculated in 2000 was below the allowable 4 percent level and less than 30 percent of that mortality had been females. Finally, development of a conservation strategy to demonstrate the existence of adequate regulatory mechanisms for populations was completed in March 2003, and incorporation of these habitat standards into Forest Plans and habitat management is currently underway (Yellowstone Interagency Conservation Strategy Team 2003).

According to the GBRP, to facilitate recovery of the population, a conservative approach is taken toward allowable mortality, accounting for error in both minimum population estimates and unknown, unreported mortality. Studies by Harris (1986) indicate that a grizzly bear population can sustain an average annual human-caused mortality of six percent without experiencing a decline. Based on a conservative approach allowing for an estimated level of unknown, unreported bear mortality, and to help achieve population recovery, the maximum allowable known human-caused mortality for the Yellowstone population is set at 4 percent of the most recent 3-year sum of the population estimate, of which no more than 30 percent may be female (USFWS 1993). Applying this 4 percent figure to the 2000 minimum population estimate yields 354 x 0.04 or a total of 14 bears (4 female bears) that could theoretically be taken each year without population decline. The recent (1995 through 2000) 6-year average annual, known human-caused mortality in the Yellowstone ecosystem is 8.2 bears per year, with an annual, known human-caused female mortality of 3.7 bears per year. Thus, human-caused grizzly bear mortality appears to be below the thresholds established in the GBRP. However, during 1995 and 1996 the female mortality exceeded those levels identified in the GBRP (7 known human-caused female mortalities), based on a percentage of the minimum population. The implications of the 1995 mortality to long-term survival of the grizzly bear and the ability to meet recovery criteria have not yet been fully analyzed. It should be noted though, that estimations are based upon the minimum population estimate, with other estimation methods resulting in significantly higher population estimates (Eberhart and Knight 1996). Long-term survival of the Yellowstone grizzly bear population, over the next 100-200 years, is contingent upon minimizing average annual mortality within the total population, especially that of adult females (Knight and Eberhardt 1984, 1985). Thus, preventing adult female mortality is the key factor in maintaining the grizzly bear population (Knight and Eberhardt 1984).

Based on population monitoring, sightings of females with young have increased in recent years. These increases may, in part, be due to increases in survey efforts, or increased effectiveness of survey methods or sightability. In general, recent years have been good in terms of natural bear food production/availability, resulting in younger age classes of bears accustomed to fairly good food availability. As was witnessed in 1995, a year of drought and poor food production, bears searched widely for food, bringing them into closer contact with humans, increasing bear-human conflicts, and resulting in more control/management actions.

Life History

Home range and dispersal. The grizzly bear has a home range of 130 to 1,300 sq km (50 to 500 sq mi) and uses a diverse mixture of forests, moist meadows, grasslands, and riparian habitats to complete its life cycle. Grizzly bears generally prefer large, remote areas of habitat for feeding, denning, and reproduction that are isolated from human development (USFWS 1995). Grizzly bears have large home ranges, meaning that they require large areas to fulfill all

of their basic biological needs, including food and shelter. Long distance travel habits of grizzly bears increase the risks of contact with humans, including highway crossings, and contact with hunters, recreationists, and a variety of human congregations. Isolation from human activities is extremely important for bear survival, as grizzly bears habituate to human foods quickly and become pests. Pest bears often must be eliminated or removed from developed areas. Avoiding human-caused bear mortality is a goal of the Recovery Plan, and is essential to maintaining a viable grizzly bear population (USFWS 1993).

Grizzly bears require dense forest cover for hiding and security. Gillin et al. (1994) studied the impact of thinning and clearcutting on grizzly bear use in the YGBE. Although the amounts of bear foods available in logged areas were similar to those of undisturbed control sites, grizzly bears generally did not use areas with human-caused habitat disturbances. The lack of security cover and overstory cover are believed to be major causes of this (Gillin et al. 1994).

Diet. The grizzly bear is an opportunistic feeder that uses a wide variety of plant and animal food sources. Grizzly bears in the YGBE have the highest percentage of meat consumption in their diet of any inland grizzly bear population (Hilderbrand et al. 1999). About 30 to 70 percent of the diet of the grizzly bears in the YGBE is from some form of animal matter, including ungulates, fish, moths, ants, wasps, and other insects, and small mammals (Barber 2001).

Meat in the grizzly bear's diet varies by season and available forage. Ungulates are an especially important food source for bears in the spring and fall (Knight et al. 1984). Grizzly bear use of ungulate carcasses in the spring and fall in YNP is well documented (Podruzny and Gunther 2001). The grizzly bear eats small mammals such as pika and marmots. However, small mammals form a relatively small portion of the grizzly bear diet (Barber 2001). Spawning cutthroat trout in streams surrounding Yellowstone Lake in YNP have been documented as an important food source for grizzly bears in that region (Haroldson et al. 2001). Army cutworm moths (ACMs) are also an important food source for bears in the YGBE. These moths congregate in remote, high altitude alpine talus areas and feed on alpine flowers. ACMs provide important dietary fat in the fall, when grizzly bears are preparing for hibernation, and are also positively correlated with bear reproductive success (Bjornlie and Haroldson 2001). The moths then migrate back to lower elevations to deposit their eggs, leaving the alpine areas between August and October. In addition, ACM congregation sites are in remote areas, and therefore reduce human-bear conflicts by isolating the bears.

The grizzly bear also makes use of a variety of vegetative food sources. Whitebark pine seeds are an important fall source of food for grizzly bears in the YGBE (Mattson et al. 1991), and use of this food by the bear is positively associated with fecundity and survivorship of the population (Mattson and Reinhard 1994). Bears consume whitebark pine seeds contained in red squirrel cone caches (Mattson and Jonkel 1990). Studies show that in years when the whitebark pine seed crop is low, there is an exponential increase in human-bear conflicts (Mattson et al. 2001). This is likely due to bears seeking alternative food sources, such as clover and yampa, that occur at lower elevations and closer to humans. In addition to supplying a food source high in fat, whitebark pine seed crops also serve grizzly bears by keeping them occupied at high elevations far from intense human use. Other grizzly bear seasonal use of foliage includes graminoids, horsetail, forbs, and fruits (whortleberry and huckleberry) (Knight et al. 1984; Mattson and Knight 1991). Bears also eat limited amounts of mushrooms.

Den site selection. Denning studies conducted by Judd et al. in the mid-1980s (as cited in USFS 2000a) indicate that YGBE grizzly bears generally construct dens in areas far from human disturbance at an elevation of about 2,000 to 3,050 m (6,500 to 10,000 ft). North exposures, 30 to 60 degree slopes, and sites with whitebark pine and subalpine fir appeared from the study to be preferred denning sites of grizzly bears. Denning bears can be disturbed by winter sport activities such as snowmobiling, and current studies are focused on minimizing disturbance by controlling access to important denning areas (Podruzny et al. 2002).

Factors that affect the grizzly bear. Transportation routes are a major cause of habitat fragmentation of grizzly bear habitat (Ruediger 2000; Gibeau et al. 2001). According to Gibeau et al., "vegetative hiding cover is always removed from the transportation corridor surface and along some portion of the right-of-way, thus making the corridor inhospitable or dangerous to grizzly bears" (2001). Loss of hiding and security cover due to a wider road and roadway clear zone contributes to a loss of connectivity between habitat patches. Grizzly bear mortality from bear/vehicle collisions has been recorded only four times between 1989 and 2001 in the YGBE. Two known collision mortalities occurred along the North Fork Highway (U.S. 14), and two collision mortalities occurred in YNP. These locations are greater than 50 km (31 mi) from the project area.

Canada lynx

Status of the Species

On December 26, 2002, the District Court for the District of Columbia issued an order that enjoins the Service from issuing any "written concurrence(s)" for actions proposed by any Federal agencies that "may affect, but are not likely to adversely affect" the Canada lynx. Until further notice, all consultations concerning effects to the Canada lynx must be conducted in accordance with the direction of the Court. Specifically, any actions subject to consultation that "may affect" the Canada lynx require formal consultation as described in 50 CFR 402.14. Preparation of a Biological Opinion that addresses how the proposed action is expected to affect the Canada lynx is required in order to complete the procedural provisions of section 7 of the Act.

Species/Critical Habitat Description

The Canada lynx is a medium-sized cat with long legs; large, well-furred paws; long tufts on the ears; and a short, black-tipped tail (McCord and Cardoza 1982). The winter pelage of the lynx is dense and has a grizzled appearance with grayish-brown mixed with buff or pale brown fur on the back, and grayish-white or buff-white fur on the belly, legs, and feet. Summer pelage of the lynx is more reddish to gray-brown (Koehler and Aubry 1994). Adult males average 10 kilograms (kg) (22 pounds (lbs)) in weight and 85 centimeters (cm) (33.5 inches (in)) in length (head to tail), and females average 8.5 kg (19 lbs) in weight and 82 cm (32 in) in length (Quinn and Parker 1987). The lynx's long legs and large feet make it highly adapted for hunting its prey in deep snow.

Classification of the Canada lynx (also called the North American lynx) has been subject to revision. In accordance with Wilson and Reeder (1993), the lynx in North America is *Lynx canadensis*. Previously the Latin name *L. lynx canadensis* was used for the Canada lynx (Jones

et al. 1992; S. Williams, Texas Tech University, pers. comm. 1994). Other scientific names still in use include *Felis lynx* or *F. lynx canadensis* (Jones et al. 1986; Tumlison 1987).

In 1998, the lynx was proposed for listing as a threatened species under the Act (63 FR, July 8, 1998). The lynx in the contiguous U.S. were listed as threatened effective April 23, 2000 (65 FR 16052, March 24, 2000). The Service identified one distinct population segment in the lower 48 States. No critical habitat has been designated for the threatened population of Canada lynx in the contiguous U.S. As explained in the Final Rule (65 FR 16052, March 24, 2000), designation of critical habitat would be prudent, but has been deferred until other higher priority work can be completed within the Service's current budget. At least one of five listing factors must be met for listing under the Act. These factors include: present or threatened destruction of habitat or range, over-utilization, disease or predation, inadequacy of existing regulatory mechanisms, or other natural or human-made causes. The sole factor for listing the Canada lynx as threatened was inadequacy of existing regulatory mechanisms, specifically the lack of Forest Land and Resource Management Plans guidance to address the needs of lynx.

Life History

Home range and dispersal. Lynx home range size varies by the animal's gender, abundance of prey, season, and the density of lynx populations (Hatler 1988; Koehler 1990; Poole 1994; Slough and Mowat 1996; Aubry et al. 2000; Mowat et al. 2000). Documented home ranges vary from 8 to 800 sq km (3 to 300 sq mi) (Saunders 1963; Brand et al. 1976; Mech 1980; Parker et al. 1983; Koehler and Aubry 1994; Apps 2000; Mowat et al. 2000; Squires and Laurion 2000). Preliminary research supports the hypothesis that Canada lynx home ranges at the southern extent of the species' range are generally large compared to those in the core of the range in Canada (Koehler and Aubry 1994; Apps 2000; Squires and Laurion 2000).

Lynx are capable of dispersing extremely long distances (Mech 1977; Washington Department of Wildlife 1993); for example, a male lynx was documented traveling 616 km (370 mi) (Brainerd 1985). Lynx disperse primarily when snowshoe hare (*Lepus americanus*) populations decline (Ward and Krebs 1985; Koehler and Aubry 1994; O'Donoghue et al. 1997; Poole 1997). Subadult lynx disperse even when prey is abundant (Poole 1997), presumably as an innate response to establish home ranges.

During the early 1960s and 1970s, there were numerous occurrences of lynx documented in atypical habitat, such as in North Dakota. In those years, harvest returns indicated unprecedented cyclic lynx highs for the 20th century in Canada (Adams 1963; Harger 1965; Mech 1973; Gunderson 1978; Thiel 1987; McKelvey et al. 2000b). Many of these unusual observations were probably dispersing animals that either were lost from the population or later returned to suitable habitat.

Diet. Snowshoe hares are the primary prey of lynx, comprising 35 to 97 percent of the diet throughout the range of the lynx (Koehler and Aubry 1994). Other prey species include red squirrel (*Tamiasciurus hudsonicus*), grouse (*Bonasa umbellus*, *Dendragopus* spp., *Lagopus* spp.), flying squirrel (*Glaucomys sabrinus*), ground squirrel (*Spermophilus parryii*, *S. Richardsonii*), porcupine (*Erethrizon dorsatum*), beaver (*Castor canadensis*), mice (*Peromyscus* spp.), voles

(*Microtus* spp.), shrews (*Sorex* spp.), fish, and ungulates as carrion or occasionally as prey (Saunders 1963; Van Zyll de Jong 1966; Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979; Koehler 1990; Staples 1995; O'Donoghue et al. 1998).

During the cycle when snowshoe hares become scarce, the proportion and importance of other prey species, especially red squirrel, increases in the diet of the Canada lynx (Brand et al. 1976; O'Donoghue et al. 1998; Apps 2000; Mowat et al. 2000). However, Koehler (1990) suggested that a diet of red squirrels alone might not be adequate to insure lynx reproduction and survival of kittens. Most research has focused on the lynx's winter diet. Summer diets are poorly understood throughout the range of the lynx. Mowat et al. (2000) reported, through their review of the literature, that summer diets of lynx have less snowshoe hare and more alternate prey species, possibly due to a greater availability of other species at that time of the year.

There has been little research on the Canada lynx's diet specific to the southern portion of their range except in Washington (Koehler et al. 1979; Koehler 1990). Southern populations of lynx may prey on a wider diversity of species than northern populations because of lower average snowshoe hare densities and differences in small mammal communities. In areas characterized by patchy distribution of lynx habitat, lynx may prey opportunistically on other species that occur in adjacent habitats, potentially including white-tailed jackrabbit (*Lepus townsendii*), black-tailed jackrabbit (*Lepus californicus*), sage grouse (*Centrocercus urophasianus*), and Columbian sharp-tailed grouse (*Tympanichus phasianellus*) (Quinn and Parker 1987; Lewis and Wenger 1998). In northern regions, when snowshoe hare densities decline, the lower quality diet causes sudden decreases in the productivity of adult female lynx and decreased survival of kittens, which causes the numbers of breeding lynx to level off or decrease (Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979; Poole 1994; Slough and Mowat 1996; O'Donoghue et al. 1997). Relative densities of snowshoe hares at southern latitudes are generally lower than those in the north, and differing interpretations of the population dynamics of southern populations of snowshoe hares have been proposed (Hodges 2000b).

Snowshoe hares have evolved to survive in areas that receive deep snow (Bittner and Rongstad 1982). Primary forest types that support snowshoe hares are subalpine fir, Englemann spruce, Douglas fir, and lodgepole pine in the western U.S., and spruce/fir, pine, and deciduous forests in the eastern U.S. (Hodges 2000b). Within these habitat types, snowshoe hares prefer stands of conifers with shrub understories that provide forage, cover to escape predators, and protection during extreme weather (Wolfe et al. 1982; Monthey 1986; Koehler and Aubrey 1994). Hares' use of habitat is correlated with understory cover (Hodges 2000a). Early successional forest stages generally have greater understory structure than do mature forests, and therefore, support higher hare densities (Hodges 2000a, 2000b). However, mature forests can also provide snowshoe hare habitat as openings are created in the canopy when trees succumb to disease, fire, wind, ice, or insects, and the understory develops (Buskirk et al. 2000b).

Canada lynx seem to prefer to move through continuous forest, using the highest terrain available such as ridges and saddles (Koehler 1990; Staples 1995). Cover is important to lynx when searching for food (Brand et al. 1976), but lynx often hunt along edges (Mowat et al. 2000). Kesterson (1988) and Staples (1995) reported that lynx hunted along the edges of mature stands within a burned forest matrix, and Major (1989) found that lynx hunted along the edge of dense riparian willow stands. Lynx have been observed (via snow tracking) to avoid large openings (Koehler 1990; Staples 1995) during daily movements within their home range.

Den site selection. Canada lynx use large wood debris, such as downed logs, root wads, and windfalls to provide denning sites with security and thermal cover for kittens (McCord and Cardoza 1982; Koehler 1990; Koehler and Brittell 1990; Mowat et al. 2000; Squires and Laurion 2000). During the first few months of life, lynx kittens are left alone at denning sites when the female lynx hunts. Downed logs and overhead cover provide protection for kittens from predators, such as owls, hawks, and other carnivores during the denning period.

The age of the forest stand does not seem as important for denning habitat as the amount of downed, woody debris available (Mowat et al. 2000). Den sites may be located within older regenerating stands (>20 years since disturbance), in mature conifer forests, or in mixed conifer-deciduous (typically spruce/fir or spruce/birch) forests. In Washington, Canada lynx used lodgepole pine, spruce (*Picea* spp.), and subalpine fir (*Abies lasiocarpa*) forests older than 200 years with an abundance of downed woody debris for denning (Koehler 1990). A den site in Wyoming was located in a mature subalpine fir/lodgepole pine forest with abundant downed logs and a high amount of horizontal cover (Squires and Laurion 2000). A lynx den site found in Maine in 1999 was located in a forest stand in red spruce (*Picea rubra*) cover type that was logged in 1930 and again in the 1980s, and is currently regenerating into hardwoods. The denning site in Maine had a dense understory and an abundance of dead and downed woody debris.

Denning habitat must be in or near foraging habitat to be functional. The hunting range of females is restricted at the time of parturition, and their need to feed kittens requires an abundance of prey. Canada lynx, like other carnivores, frequently move their kittens until they are old enough to hunt with their mother. Multiple nursery sites are needed that provide kittens with overhead cover and protection from predators and the elements. Downed logs and overhead cover must also be available throughout the home range to provide security when lynx kittens are old enough to travel (Bailey 1974).

Recruitment. Breeding occurs through March and April in the north (Quinn and Parker 1987). Kittens are born in May to June in southcentral Yukon (Slough and Mowat 1996). The male Canada lynx does not help with rearing young (Eisenberg 1986). Slough and Mowat (1996) reported yearling females giving birth during periods when snowshoe hares were abundant; whereas male lynx may be incapable of breeding during their first year of life (McCord and Cardoza 1982). In northern study areas during the low phase of the hare cycle, few, if any live kittens are born and few yearling females conceive (Brand and Keith 1979; Poole 1994; Slough and Mowat 1996). However, Mowat el al. (2000) suggested that in the far north, some lynx recruitment occurs when hares are scarce and this may be important in lynx population maintenance during hare lows. During periods of hare abundance in the northern taiga, litter size of adult females averages 4 to 5 kittens (Mowat et al. 1996).

Koehler (1990) suggested that the low number of kittens produced in northcentral Washington was comparable to northern populations during periods of low snowshoe hare abundance. In his study area, 2 radio-collared females had litters of 3 and 4 kittens in 1986 and 1 kitten in 1987 (the actual litter size of one of the females in 1987 was not determined) (Koehler 1990). Of the known-size litters in Washington, one kitten survived the first winter. In Montana, Squires and Laurion (2000) reported that one marked female produced two kittens in 1998. In 1999, two of

three females produced litters of two kittens each. In Wyoming (Squires and Laurion 2000), one female produced 4 kittens in 1998, but snow tracking indicated that the kittens were not with the female in November, and were presumed dead. The same female produced 2 kittens in 1999.

Mortality. Reported causes of Canada lynx mortality vary between studies. The most commonly reported causes include starvation of kittens (Quinn and Parker 1987; Koehler 1990), and human-caused mortality, mostly fur trapping (Ward and Krebs 1985; Bailey et al. 1986). Significant lynx mortality due to starvation has been demonstrated in cyclic populations of the northern taiga, during the first two years of snowshoe hare scarcity (Poole 1994; Slough and Mowat 1996). Various studies have shown that, during periods of low hare numbers, starvation can account for up to two-thirds of all natural lynx deaths. Trapping mortality may be additive rather than compensatory during the low period of the hare cycle (Brand and Keith 1979). Hunger-related stress, which induces dispersal, may increase the exposure of lynx to other forms of mortality such as trapping and highway collisions (Brand and Keith 1979; Ward and Krebs 1985; Bailey et al. 1986). Exploitation competition may contribute to lynx starvation and reduced recruitment. During periods of low snowshoe hare numbers, starvation accounted for up to two-thirds of all natural lynx deaths in the Northwest Territories of Canada (Poole 1994).

Paved roads have been a mortality factor in Canada lynx translocation efforts within the historical range of the lynx. In New York, 18 translocated lynx were killed on highways (Brocke et al. 1990). It has been suggested by Brocke et al. (1990) that translocated animals may be more vulnerable to highway mortality than resident lynx. Two lynx were killed on 2- and 4-lane Colorado highways following their release as part of a reintroduction effort (G. Byrne, Colorado Dept. of Wildlife, pers. comm. 1999). Other than translocated animals, there have been 2 documented occurrences of highway mortality in Wisconsin (Theil 1987) and Minnesota. Twelve resident lynx were documented being killed on highways in Canada and Alaska (Staples 1995; Gibeau and Heur 1996).

Predation on lynx by mountain lion, coyote (*Canis latrans*), wolverine (*Gulo gulo*), gray wolf, fisher (*Martes pennanti*), and other lynx has been confirmed (Berrie 1974; Koehler et al. 1979; Poole 1994; Slough and Mowat 1996; O'Donoghue et al. 1997; Apps 2000; Vashon et al. 2003; Squires and Laurion 2000). Squires and Laurion (2000) reported 2 of 6 mortalities of radio-collared lynx in Montana were due to mountain lion predation. Observations of such events are rare, and the significance of predation on lynx populations is unknown.

Interspecific relationships with other carnivores. Buskirk et al. (2000a) described the two major competition impacts to lynx as exploitation (competition for food) and interference (avoidance). Of several predators examined (birds of prey, coyote, gray wolf, mountain lion, bobcat, and wolverine), coyotes were deemed to most likely pose local or regionally important exploitation impacts to Canada lynx, and coyotes and bobcats were deemed to possibly impart important interference competition effects on lynx. Mountain lions were described as interference competitors, possibly impacting lynx during summer and in areas lacking deep snow in winter, or when high elevation snow packs develop crust in the spring. In southern portions of snowshoe hare range, predators may limit hare populations to lower densities than in the taiga (Dolbeer and Clark 1975; Wolff 1980; Koehler and Aubry 1994). Based on only anecdotal evidence, Parker et al. (1983) discussed competition between bobcats and Canada lynx on Cape Breton Island. Lynx were found to be common over much of the island prior to bobcat

colonization. Concurrent with the colonization of the island by bobcats, lynx densities declined and their presence on the island became restricted to the highlands, the one area where bobcats did not become established.

Population Dynamic

In Canada and Alaska, Canada lynx populations undergo extreme fluctuations in response to snowshoe hare population cycles, enlarging or dispersing from their home ranges and ceasing the recruitment of young into the population after hare populations decline (Mowat et al. 2000). In the southern portion of the range in the contiguous U.S., lynx populations appear to be naturally limited by the availability of hares, as suggested by large home range size, high kitten mortality due to starvation, and greater reliance on alternate prey. These characteristics appear to be similar to those exhibited by lynx populations in the taiga during the low phase of the population cycle (Quinn and Parker 1987, Koehler 1990, Aubry et al. 2000). This is likely due to the inherently patchy distribution of lynx and hare habitat in the contiguous U.S., and the corresponding lower densities of hares.

A lack of accurate data limits our understanding of Canada lynx population dynamics in the contiguous U.S. and precludes drawing definitive conclusions about lynx population trends. Formal surveys designed specifically to detect lynx have rarely been conducted. Many reports of lynx (e.g., visual observations, snow tracks) have been collected incidentally to other activities, but cannot be used to infer population trends. Long-term trapping data have been used to estimate population trends for various species. However, trapping returns are strongly influenced by trapper effort, which varies between years, and therefore may not accurately reflect population trends. Another important problem is that trapping records of many States did not differentiate between bobcats and lynx, referring to both as "lynxcats." Overall, the available data are too incomplete to infer much beyond simple occurrence and distribution of lynx in the contiguous U.S. (McKelvey et al. 2000b).

Canada lynx populations in the contiguous U.S. occur at the southern periphery of a metapopulation whose core is located in the northern boreal forest of central Canada (McCord and Cardoza 1982; Quinn and Parker 1987; McKelvey et al. 2000a). Lynx population dynamics may emanate from the core to the periphery, as evidenced by a lagged correlation of lynx trap records and observations (McKelvey et al. 2000b; Mowat et al. 2000). In the Great Lakes Geographic Area, population dynamics in recent decades appear to be strongly driven by immigration from Canada (McKelvey et al. 2000b). In other areas and time periods, however, it is not known to what extent the correlation is due to immigration from Canada, population responses to the same factors controlling northern populations, or a combination of the two.

It is suspected that some areas in the contiguous U.S. naturally act as sources of lynx (recruitment is greater than mortality) that are able to disperse and potentially colonize other patches (McKelvey et al. 2000a). Other areas may function as sinks, where lynx mortality is greater than recruitment, and lynx are lost from the overall population. Sink habitats are most likely those places on the periphery of the southern boreal forest where habitat becomes more fragmented and more distant from larger lynx populations. Fluctuations in prey populations may cause some habitat patches to change from being sinks to sources, and vice versa. The ability of naturally dynamic habitat to support lynx populations may change as the habitat undergoes natural succession following natural or manmade disturbances (i.e., fire, clearcutting).

Status and Distribution

The following discussion of the status and distribution of Canada lynx is largely excerpted from the Service's final rule (65 FR 16052, March 24, 2000). The historical and present range of the lynx north of the contiguous U.S. includes Alaska, and that part of Canada that extends from the Yukon and Northwest Territories, south across the U.S., border and east to New Brunswick and Nova Scotia. In the contiguous U.S., lynx historically occurred in the Cascades Range of Washington and Oregon; along the Rocky Mountain Range in Montana, Wyoming, Idaho, eastern Washington, eastern Oregon, northern Utah, and Colorado; in the western Great Lakes Region; and in the northeastern U.S. region, from Maine southwest to New York (McCord and Cardoza 1982; Quinn and Parker 1987).

The distribution of the Canada lynx in North America is closely associated with the distribution of the North American boreal forest (Agee 2000). In Canada and Alaska, lynx inhabit the classic boreal forest ecosystem known as the taiga (McCord and Cardoza 1982; Quinn and Parker 1987; Agee 2000; McKelvey et al. 2000b). The range of the lynx extends south, from the classic boreal forest zone into the subalpine forest of the western U.S., and the boreal/hardwood forest ecotone in the eastern U.S. (Agee 2000; McKelvey et al. 2000b). Forests with boreal features (Agee 2000) extend south into the contiguous U.S. along the Cascade and Rocky Mountain Ranges in the west, the western Great Lakes Region, and along the Appalachian Mountain Range or the northeastern U.S. Within these general forest types, lynx are most likely to persist in areas that receive deep snow, to which the lynx is highly adapted (Ruggiero et al. 2000). Lynx are rare or absent from the wet coastal forests of Alaska and Canada (Mowat et al. 2000).

As its southern margins in the contiguous U.S., forests with boreal features, or southern boreal forests, become naturally fragmented as they transition into other vegetation types. Southern boreal forest habitat patches are small relative to the extensive northern boreal forest of Canada and Alaska, which constitutes the majority of the Canada lynx range. Many southern boreal forest habitat patches within the contiguous U.S. cannot support resident populations of lynx and their primary prey species.

The complexities of Canada lynx life-history and population dynamics, combined with a general lack of reliable population data for the contiguous U.S., makes it difficult to ascertain the past or present population status of lynx in the contiguous U.S. It is impossible to determine with certainty whether reports of lynx in many States were: (1) animals dispersing from northern populations that were effectively lost because they did not join or establish resident populations, (2) animals that were a part of a resident population that persisted for many generations, or (3) a mixture of both resident and dispersing animals.

The final rule (65 FR 16052, March 24, 2000) determining threatened status for the Canada lynx in the contiguous U.S. summarized lynx status and distribution across four regions that are separated from each other by ecological barriers consisting of unsuitable lynx habitat. These distinct regions are the Northeast, the Great Lakes, the Northern Rocky Mountains/Cascades, and the Southern Rocky Mountains. While these regions are ecologically unique and discrete, the lynx is associated with southern boreal forest types in each and, with the exception of the Southern Rocky Mountains Region, each area is geographically connected to the much larger population of lynx in Canada.

Northeast Region (Maine, New Hampshire, Vermont, New York). Based on an analysis of cover types and elevation zones containing most of the lynx occurrences, McKelvey et al. (2000b) determined that, at the broad scale, most lynx occurrence records in the Northeast were found within the "Mixed Forest-Coniferous Forest-Tundra" cover type at elevations ranging from 250 to 750 m (820 to 2,460 ft). This habitat type in the northeast U.S. occurs along the northern Appalachian Mountain range from southeastern Quebec, western New Brunswick, and western Maine, south through northern New Hampshire. This habitat type becomes naturally more fragmented and begins to diminish to the south and west, with a disjunct segment running north-south through Vermont, an extensive patch of habitat in the Adirondacks or northern New York, and with a few more distant and isolated patches in Pennsylvania (see Figure 8.23 in McKelvey et al. 2000b).

Based on documentation of Canada lynx presence and reproduction in Maine, the substantial lynx harvest in southeastern Quebec, and the connectivity of boreal forest south of the St. Lawrence River in Quebec, New Brunswick, Maine, and New Hampshire, it is concluded that a population of lynx continues to exist in this area, the core of the region. Connectivity between the U.S. and Canada north of the St. Lawrence River has been reduced by development in southeastern Canada and ice breaking to allow year-round shipping on the river.

Historical accounts provide evidence of the presence, reproduction, and persistence of Canada lynx in several northern and western townships of Maine (Hoving 2001), indicating the presence of a persistent resident lynx population historically. Since 1999, intensive lynx research in northern Maine has resulted in 30 different lynx radio-collared in the study area, and 17 litters with 37 kittens documented (Maine Department of Inland Fisheries and Wildlife 2003), demonstrating the current existence of a resident population. Habitat for lynx and snowshoe hares is currently optimal, as a result, lynx numbers are high. Hare populations in Maine seem to have started their cyclic decline (Homyack 2003). Maine's lynx numbers are expected to decline following the hare cycle.

Although habitat in New Hampshire is contiguous with that in Maine, the amount of current or historical Canada lynx habitat in New Hampshire is much less than that in Maine, with recent modeling predicting approximately 1,000 sq km (400 sq mi) (Hoving 2001). Lynx harvest records ranged from 1 to 20 per year in the 1930s and 0 to 3 per year between 1940 and 1964 (Brocke et al. 1993, McKelvey et al. 2000b). Since the 1960s, reports of lynx in New Hampshire have been rare; only two reports exist from the 1990s. Although there are no records of lynx breeding in New Hampshire, based on regular harvest reports from the past and connectivity with habitats in Maine where resident lynx occur, it is believed that a resident lynx population historically occurred in New Hampshire, but no longer exists. However, dispersed lynx may still occur in New Hampshire.

Little boreal forest exists currently or historically in Vermont, and what habitat does exist is somewhat isolated from habitat in New Hampshire (W. Laroche, Vermont Department of Fish and Wildlife, in litt. 2003). Only four verified records of Canada lynx exist for Vermont (McKelvey et al. 2000b). There is no evidence that lynx reproduction ever occurred in Vermont. In the Green Mountain National Forest, all potential lynx habitat occurs in small patches that are not large enough to support lynx, and bobcats are present throughout these areas (P. Brewster,

Green Mountain and Finger Lakes National Forests, in litt. 2000), evidence that the areas are not suitable for lynx. Based upon the limited amount and dispersed nature of suitable habitat, lynx may occur in Vermont as dispersers but have not established resident populations.

An "island" of boreal forest exists both historically and currently in the Adirondack Mountains of New York. A resident Canada lynx population reportedly occurred in the northern region of New York, particularly in the Adirondack Mountains, but it was considered extirpated by 1900 (Brocke 1982; McKelvey et al. 2000b). However, there are 23 verified lynx occurrences since 1900, primarily from the Adirondack Mountains (McKelvey et al. 2000b). The most recent verified record was from 1973 (McKelvey et al. 2000b), coincident with an extreme cyclic population high. Hoving's (2001) model predicted approximately 190 sq km (73 sq mi) of potential lynx habitat in New York, an area only slightly larger than the average home range of a single male lynx. Much of this forest is mature without the understory necessary to support a snowshoe hare population capable of sustaining lynx (G. Batcheller, New York State Division of Fish, Wildlife, and Marine Resources, pers. comm. 2003). A resident population may have existed in New York prior to 1900, however, records of lynx since 1900 are that of dispersed lynx.

Great Lakes Region (Minnesota, Wisconsin, Michigan). The majority of Canada lynx occurrence records in the Great Lakes Region are associated with the "mixed deciduous-coniferous forest" type (McKelvey et al. 2000b). Within this forest type, the highest frequency of lynx occurrences were in the sugar maple (*Acer saccharum*), basswood (*Tilia* spp.), jack pine (*Pinus banksiana*), white pine (*P. strobus*), and red pine (*P. resinosa*) forest types (McKelvey et al. 2000b). These forest types are found primarily in northeastern Minnesota, northern Wisconsin, and the western portion of Michigan's upper peninsula. Mixed deciduous-coniferous forest covers an extensive area in this region, but much of this area is considered marginal habitat for lynx because it is a transitional forest type at the edge of the snowshoe hare range. Habitat at the edge of hare range supports lower hare densities (Buehler and Keith 1982) that may not be sufficient to support lynx reproduction. Snow depths within appropriate habitat that allow lynx a competitive advantage over other carnivores (i.e., coyotes), occur only in limited areas in northeastern Minnesota, extreme northern Wisconsin, and Michigan's upper peninsula.

Minnesota has a substantial number of Canada lynx reports, primarily trapping records (McKelvey et al. 2000b), as expected because of the connectivity of the boreal forest with that of Ontario, Canada, where lynx occur. Historically (1930-1976) the Minnesota lynx harvest ranged from 0 to 400 lynx per year (Henderson 1978). Approximate 10-year cycles are apparent in the data and are believed to be driven by immigration of lynx from Canada (Henderson 1978). In the past three years there have been 62 verified reports of lynx in northeastern Minnesota, 6 of which provided evidence of reproduction (usually visual observations of kittens accompanying an adult) (Minnesota Department of Natural Resources, in litt. 2003). This dramatic increase in reports corresponds with the timing for a cyclic population high to occur, and when lynx populations directly adjacent in Ontario are high. Scientists have debated whether lynx in Minnesota are members of a long-term resident population, or have dispersed from Canada and do not establish a resident population in the state (McKelvey et al. 2000b; R. Sando, Minnesota Department of Natural Resources, in litt. 1998). Research has been initiated that will help determine whether these animals are members of an established resident population in Minnesota, or if these animals fail to persist when the cyclic population high recedes.

Wisconsin and Michigan have substantially fewer records of Canada lynx (McKelvey et al. 2000b). Researchers have debated whether lynx in this region are simply dispersing lynx emigrating from Canada, are members of a resident population, or are a combination of a resident population and dispersing individuals (McKelvey et al. 2000b; R. Sando, Minnesota Department of Natural Resources, in litt. 1998). There is no evidence of lynx reproduction in Wisconsin or Michigan.

Within this region, the Service considers northeastern Minnesota to be most likely to support a resident population of Canada lynx. Records of lynx from Wisconsin and Michigan most likely were that of dispersing animals.

Northern Rocky Mountain/Cascades Region (Washington, Oregon, Idaho, Wyoming, Utah, Montana). In this region, the majority of Canada lynx occurrences are associated at a broad scale with the "Rocky Mountain Conifer Forest." Within this forest type, most of the occurrences are in moist Douglas fir (*Pseudotsuga menziesii*) and western spruce/fir forests (McKelvey et al. 2000b). Most of the lynx occurrences are in the 1,500 to 2,000 m (4,920 to 6,560 ft) elevation class (McKelvey et al. 2000b). These habitats are found in the Rocky Mountains of Montana, Idaho, eastern Washington, and Utah, the Wallowa Mountains and Blue Mountains of southeast Washington and northeastern Oregon, and the Cascade Mountains in Washington and Oregon. The majority of verified lynx occurrences in the U.S. and the confirmed presence of resident populations are from this region. The boreal forest of Washington, Montana, and Idaho is contiguous with that in adjacent British Columbia and Alberta, Canada. Strong evidence exists to support the presence of resident lynx populations distributed throughout much of the forest types considered lynx habitat in western Montana and north-central and northeastern Washington. Resident lynx populations probably exist in contiguous habitats in Idaho and northwestern Wyoming. There is no evidence of reproduction in Oregon or Utah, and lynx have probably always occurred intermittently as dispersers in both states.

In Wyoming, the Canada lynx has been protected as a non-game species with no open season since 1973. It is considered rare (USFWS 1998a and b) in the state and has been documented in the Wind River and Wyoming Mountain Ranges. The Canada lynx is classified as a Species of Special Concern - Class 2 by the Wyoming Game and Fish Department, indicating that habitat is limited and populations are restricted or declining.

In Wyoming, Canada lynx occur primarily in spruce-fir and lodgepole pine forests with 8 to 12 degree slopes, at elevations between 7,995 to 9,636 ft. Quaking aspen (*Populus tremuloides*) stands and forest edges, as well as open grass meadows and forest ecotones, may also support high numbers of snowshoe hares and lynx. On a landscape scale, lynx habitat includes a mosaic of early seral stages that support hare populations, and late seral stages of dense old growth forest that provide ideal denning and security habitat. Connectivity between lynx populations is critical: dispersing corridors should be several miles wide with only narrow gaps. Large tracts of continuous coniferous forest are the most desirable for lynx travel and dispersal (Tanimoto 1998).

Using the National Lynx Detection Protocol (McKelvey et al. 1999), NFS personnel detected Canada lynx in the Absaroka Mountain Range, SNF, during 2000 (K. McKelvey, pers. comm.). Ratner (2001) detected 5 possible lynx tracks at 6 total study sites in the southern Wyoming,

Wind River, and Absaroka Mountain Range during winter 2000-2001. Snow tracking work preformed by Montana Department of Fish, Wildlife, and Parks biologists indicate lynx presence in the northern portion of the Greater Yellowstone Area (GYA) in the Paradise Valley and upper Gallatin River watershed, Montana, but resident lynx have not been confirmed. Pyare (2001) did not detect lynx in Grand Teton National Park and adjoining Bridger Teton National Forest using hair snares deployed from 2000-2001.

Historical information suggests that Canada lynx were present but uncommon in YNP from 1880 to 1980. Consolo-Murphy and Meagher (1999) documented 50 sightings and track reports of lynx (unknown reliability) in YNP from 1893 to 1995. Most sightings and records of tracks occurred after 1930. In the 1990's, numerous researchers conducted studies to document the presence of rare carnivores in YNP, but none detected lynx (Harter et al. 1993, Gehman et al. 1994, Gehman and Robinson 1998). However, YNP received notification on May 1, 2003, from their DNA laboratory in Missoula, Montana, that two samples (hair and scat) obtained while following a probable set of lynx tracks on February 27, 2003, were confirmed as lynx DNA. The scat and hair sample were collected from day beds and from tracks on the east side of Yellowstone Lake, YNP. Based on tracks and day beds, one kitten and one adult lynx were present. Efforts to document gender and individual genotypes are pending. The distance from the tracks to Segment 4 of the Beartooth Highway is approximately 50 air miles.

Lynx analysis units (LAUs) have been defined for the SNF in areas with suitable habitat. LAUs have been mapped to be approximately the size of female lynx home ranges. Collectively, the Lynx Conservation Assessment Strategy (LCAS, Ruediger et al., 2000) will provide consistent and effective conservation of lynx on federal lands, and were, in part, the basis for assessing the effects of Segment 4 of the Beartooth Highway.

Southern Rocky Mountains Region (Colorado, SE Wyoming). Colorado represents the extreme southern edge of the range of the Canada lynx. The southern boreal forest of Colorado and southeastern Wyoming is isolated from boreal forest in Utah and northwestern Wyoming by the Green River Valley and the Wyoming basin (Findley and Anderson 1956). These areas likely reduce opportunities for genetic interchange with the Northern Rocky Mountains/Cascades Region and Canada (Halfpenny et al. 1982; Koehler and Aubry 1994). A majority of the lynx occurrence records in Colorado and southeastern Wyoming are associated with the "Rocky Mountain Conifer Forest" type. The occurrences in the Southern Rockies were generally at higher elevations (1,250 to over 3,750 m [4,100 to 12,300 ft]) than were all other occurrences in the West (McKelvey et al. 2000b).

There are relatively few historic Canada lynx records from this region (McKelvey et al. 2000b). We are uncertain whether the Southern Rockies supported a small resident population historically or whether such records were of dispersed lynx that arrived during extremely high population cycles. If these historic records represent resident populations rather than dispersing animals that emigrated from the Northern Rocky Mountains, Cascades, or Canada, then it is believed a viable native resident lynx population no longer exists in the Southern Rocky Mountains.

Reports from other locations. During the early 1960s, concurrent with an unprecedented cyclic high in Canada, lynx moved into the Great Plains and the Midwest Region of the U.S. (Gunderson 1978; Mech 1980; DeStefano 1987; South Dakota Natural Heritage Program, in litt.

1994). These records are outside of the southern boreal forests where most lynx occurrences are found (McKelvey et al. 2000b). The Service considers Canada lynx observations in Nevada, North Dakota, South Dakota, Iowa, Nebraska, Indiana, Ohio, and Virginia to be individuals dispersing subsequent to periods of cyclic high lynx numbers in Canada (Hall and Kelson 1959; Burt 1954; McKelvey et al. 2000b; S. Johnson, Indiana Department of Natural Resources, in litt. 1994; P. Jones, Ohio Department of Natural Resources, in litt. 1994; W. Jobman, Smithsonian Institute, in litt. 1998). The Service does not consider these States to be within the contiguous U.S. range of the Canada lynx because they do not contain suitable lynx habitat (65 FR 16052, March 24, 2000).

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed State or Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process.

The action area is defined at 50 CFR 402 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action". For the purposes of this consultation, the Service defines the action area to be the section of U.S. Highway 212 between the project start location at KP 39.5 (MP 24.5) to the project end location at KP 69.4 (MP 43.1) in the SNF and 200 m either side of this road corridor.

Status of the Grizzly Bear within the Action Area

Historically, the portion of the project area west of the Bar Drift realignment area was occupied grizzly bear habitat. The eastern portion of the project area is alpine, and does not provide suitable montane forest habitat for the grizzly bear. Currently, grizzly bears occupy the same approximate geographic area within the project area as the species did historically. The range of specific bears varies from year to year, and currently there are no radio-collared bears with home ranges overlapping the project area (Barber 2002).

The project area contains the mixture of forest, moist meadows, grasslands, and riparian habitats that the grizzly bear requires to complete its life cycle. However, human uses - including roads, campgrounds, parking areas, and backcountry activities - infringe into remote areas preferred by the grizzly bear. The dense forests located in the western portion of the project area provide security cover for grizzly bears.

Mixed whitebark pines stands adjoin the western portion of the project area, and provide an important food source for grizzly bears. Blister rust has not affected the whitebark pine stands within the project area. Forests and meadows adjoining the western portion of the project area provide summer habitat for ungulates, including deer and elk. These ungulates winter at lower elevations, and therefore do not provide a substantial food source for grizzly bears (Barber 2002). No known ACM aggregation sites are near or within the project area. The Wyoming Game and Fish Department (WGFD 2003) identified Little Bear Creek, Beartooth Creek, and Canyon Creek as wild brook trout fishery streams within the project area. The WGFD (2003) also identified Beartooth Lake as an important standing water fishery for rainbow trout, brook trout, arctic

grayling, and Yellowstone cutthroat trout in the project area. In addition, the WGFD (2003) identified Long Lake as an important standing water fishery for rainbow trout, brook trout, and Yellowstone cutthroat trout in the project area.

The western portion of the project area is in the Yellowstone Grizzly Bear Recovery Zone. About 40 percent (11 km [7 mi.]) of Segment 4, in the alpine portions of the project area, is outside of the Recovery Zone. No known grizzly bear dens are located within the project area. Bears likely avoid denning near the road, campgrounds, and other recreation facilities because of the amount of human use these areas receive (Barber 2002).

The project area falls within the Crandall-Sunlight BMU, and Crandall-Sunlight subunits 1 and 2. Between 1975 and 2000, 22 different radio-collared grizzly bears were identified as using habitats in Crandall/Sunlight subunit 1, and 42 radio-collared bears were identified in Crandall/Sunlight subunit 2. From 1996-2000, four radio-collared bears (all adult females) have been located in subunit 1, and 12 radio-collared bears (including 6 adult females) were located in subunit 2 (Barber 2001).

YNP completed an annual summary of grizzly bear-human conflicts occurring in the YGBE each year from 1992 to 2000. Each wildlife management agency submits records of human-bear incidents that occurred in their respective areas of jurisdiction. Since 1992, eighteen incidents have occurred in the Crandall/Sunlight BMU. Twelve of these incidents were associated with backcountry hunting; five were conflicts at private residences where bears caused property damage and/or received food rewards; and one involved livestock depredation. No incidents of bears causing property damage or receiving food rewards at campgrounds, trailheads, or dispersed camping areas in this BMU have been documented. Bears have been observed traveling through campgrounds and other human use areas in the proposed project area (Barber 2001).

West of Beartooth Lake, the project area is in MS1 lands. MS1 areas contain grizzly population centers and habitat components needed for the survival and recovery of the species. The NFS management priority is to maintain and improve bear habitat while reducing human-bear conflicts. Approximately 10 percent (3 km [2 mi.]) of Segment 4 is within MS1, as are the Ghost Creek materials site and the Fox Creek Campground (proposed workcamp site). The off-site wetland mitigation site is on private land, and therefore does not have a MS designation. East of Beartooth Lake, the project area is located in MS3 lands. Grizzly bear presence in MS3 lands is possible, but infrequent, and the NFS management direction for MS3 areas (about 60 percent of Segment 4) is to minimize potential human-bear conflicts by discouraging bear presence, and by controlling bears involved in human-bear conflicts or frequenting areas of human use.

Grizzly bear habitat in the SNF was mapped by the NFS for use with the grizzly bear cumulative effects model (CEM). The CEM was designed to assess the inherent productivity of grizzly bear habitat and the impacts of human activities on bear use of that habitat (Weaver et al. 1986). The CEM provides a quantification of current conditions, and contrary to its name, does not assess cumulative effects of the proposed action. This combination of inherent habitat capability, or "habitat value", and its impairment by humans is called "habitat effectiveness". The coefficients of productivity developed for assessing the habitat value are a partial accounting of the net digested energy obtained by Yellowstone grizzly bears from different habitats. These coefficients, derived from grizzly bear foraging patterns in the YGBE, vary by season, region,

and type of year (Mattson 1999). The seasons are spring (March 1 to May 15), estrus (May 16 to July 15), early hyperphagia (July 16 to August 31), and late hyperphagia (September 1 to November 30).

Except during the late hyperphagia season, nearly all areas adjacent to Segment 4 currently have low habitat effectiveness. Habitat effectiveness for each season in the project area is lower than the habitat value due to existing human activity on and adjacent to the highway. The level of human activity varies in the project area between the four seasons and directly affects habitat effectiveness. Recreation use is at its highest during the early hyperphagia season. Snowmobile use is moderate in spring, as is the level of hunter activity in the late hyperphagia season. Human activity is infrequent in the project area during the estrus season. Habitat in the project area is least affected by human activity in the estrus season and most affected by human activity in early hyperphagia (Barber 2001). Because the project area is entirely contained on the SNF, direct habitat loss, decreased habitat effectiveness and habitat value, and habitat fragmentation do not constitute a great threat. Development on the SNF is controlled by the SNF Forest Plan, as well as the guidelines established by the IGBC.

Factors Affecting the Environment of the Grizzly Bear

Many roads within the GYA are being paved or reconstructed. YNP is in the process of implementing a 20-year parkwide road reconstruction plan to improve the Park's 330-mile road system. Segment 1 of U.S. 212, from the northeast entrance to YNP east to the Montana/Wyoming state line near Colter Pass, is proposed for reconstruction from 2004 to 2007. Reconstruction recently was completed on the North Fork Road from the East Entrance to YNP east to Cody, Wyoming.

Currently, the Seasonal Average Daily Traffic (SADT) is about 942 for Segment 4, and is projected to be 1,972 by the year 2025. Based on a 2001 operating speed study, speeds on Segment 4 of the Beartooth Highway range from 33 to 75 km/h (20 to 47 mph). The only speed information collected within the Wildlife Crossing Assessment Area was 67 km/h (42 mph). Although the proposed action has been designed to retain the same operating speeds [60 km/h (37 mph) on the western portion of Segment 4 and 50 km/h (31 mph) on the eastern portion of Segment 4, the increased road width and clear zone may increase driver confidence and result in increased speeds. Speeds over 75 km/h (45 mph) may result in an increased risk of bear/vehicle collisions along Segment 4.

Segment 4 of the Beartooth Highway currently is approximately 5.5 to 6.5 m (18-21 ft) wide, with two 2.75 m (9 ft) travel lanes, and 0 to 1 m (0 to 3 ft) of ditch/shoulder, in areas where forest adjoins Segment 4. Traffic volume decreases roadway permeability (the likelihood that a grizzly bear will travel across a human barrier, such as a road) and contribute to habitat fragmentation and loss of connectivity. According to Ruediger et al. (2000), traffic volumes greater than 2000 vehicles per day are detrimental to habitat connectivity for wildlife.

Higher traffic speeds also may contribute to wildlife mortality and fragmentation (Ruediger et al. 2000). Highways with speeds ranging from 80 to 115 km/h (50 to 70 mph) were studied by Gibeau et al. (2001) as high-speed roadways with potential effects on grizzly bear movement. In a study in YNP, vehicle speed was found to be the primary factor contributing to vehicle/wildlife collisions (Gunther et al. 1998). Road design was found to be more important than posted speed

limits in controlling vehicle speeds. Vehicle speeds on winding roads typically were near posted speed limits in YNP. The study also determined that about 85 percent of road kills occurred where the speed limit was greater than 75 km/h (45 mph). To date, no grizzly bear-vehicle collisions have been documented in the project area or the Crandall/Sunlight BMU.

Status of the Canada Lynx within the Action Area

The project area falls within the Northern Rocky Mountain/Cascade Mountains Geographic Area, which encompasses northern, central, and southeastern Idaho, western Montana on both sides of the Continental Divide, northeastern and southeastern Washington, northeastern Oregon, northeastern Utah, and western Wyoming (Ruediger et al. 2000). Between 1856 and 1999, approximately 344 verified lynx sightings were recorded for the Northern Rocky Mountains/Cascade Mountains Geographic Area. In Wyoming for the same time period, there are 30 verified records (McKelvey et al. 2000).

Historically, Canada lynx occupied the forested western portions of the project area. There are seven historical verified lynx records from the GYA between 1904 and 1920 (McKelvey et al. 2000). More recently, a lynx was observed in 1982 - the only recorded lynx in the region since 1920 - about 3.2 km (2 mi) north of Long Lake, which is immediately adjacent to the project area (WYNDD 2001). Very little additional information is available for lynx populations on the SNF. Surveys in the past several years have not resulted in positive identification of lynx hair or prints; however, it is assumed that lynx still use or pass through the project area at least occasionally (Barker 2002).

The area between the project start at KP 39.5 and Little Bear Creek bridge No. 1 at KP 45 is a potential "key linkage area" for Canada lynx (Barber 2001). Key linkage areas connect areas of suitable lynx foraging and denning habitat. Lynx analysis units (LAUs) have been defined for the SNF in areas with suitable habitat. LAUs are mapped to be approximately the size of female lynx home ranges. For this reason, LAUs provide a framework for determining the effects of projects and activities. LAUs also can be used to access connectivity of lynx habitat and fragmentation issues (BLM 1999). The eastern portion of Segment 4 is within LAU 1, and the western portion, including the Ghost Creek materials site and the Fox Creek Campground, are located within LAU 2.

Suitable Canada lynx and snowshoe hare habitat (primary prey for lynx) is present in forested areas west of the Top of the World Store (USFS 2000b). Suitable red squirrel (another prey of lynx) habitat is present in coniferous forests along Segment 4 (Zeveloff and Collett 1988). The project area does not provide optimal habitat for the hare because over 90 percent of the forest along the corridor is old growth forest. Old growth forests are near climax conditions, and while they do not provide good foraging habitat, they do provide suitable denning habitat for lynx (Pfister et al. 1977). However, denning activity in the project area is unlikely due to the high level of existing human disturbance from roads, campgrounds, and trails.

Little development is present in the project area. It is likely that historical travelways for the Canada lynx remain largely undisturbed. Few stands of suitable timber occur in or near the project area, so the adjacent corridors are not at risk from timber harvesting activities. Dispersed

recreation - including snowshoeing, skiing, and snowmobiling in winter and hiking and camping during the summer - takes place throughout the project area, and could potentially impact lynx connectivity.

Factors Affecting the Environment of the Canada Lynx

The existing road has fragmented suitable Canada lynx habitat north and south of the road. Existing affects to lynx from the road are probably limited by the low traffic volume, minimal nighttime traffic, and seasonal road closure from fall until late spring. Studies show that 2,000 to 3,000 vehicles per day are problematic to forest carnivores, and 4,000 or more vehicles per day may have serious effects due to mortality risks and habitat fragmentation (Ruediger et al. 2000). Current and projected traffic levels for the proposed project area are below this threshold. The Service (2000b) determined roads that cross suitable habitat might adversely influence lynx movement and that high traffic volumes along with development inhibit lynx dispersal and movement within home ranges, and may contribute to a loss of a habitat connectivity as well. There are no known lynx/vehicle collisions in the project area or in the reconstructed road segments adjacent to Segment 4.

EFFECTS OF THE ACTION

Grizzly bear

Direct Effects

The proposed action may directly affect grizzly bears. Potential direct impacts from the proposed project include habitat fragmentation and impacts to movement corridors, habitat loss, increased risk for human-bear conflicts, and temporary (short-term) displacement during construction activities.

Habitat Fragmentation and Movement Corridors

Suitable habitat for the grizzly bear will be permanently altered due to cutting and filling of steep slopes adjacent to the roadway in the western portion of the project area. No new roads are proposed, and therefore the road density for both grizzly bear subunits (Crandall/Sunlight 1 and 2) will not change as a result of the proposed project. In addition, open and total motorized access route density and secure area standards will not be exceeded. The proposed alignment will closely follow the existing alignment in most locations, resulting in no change to the miles per square mile of open roads in Crandall/Sunlight grizzly bear subunit No. 1.

Tree removal associated with temporary construction impacts and a permanent clear zone will reduce grizzly bear hiding and security cover. The existing highway and clear zone is about 6.5 to 7.1 m (21-23 ft) in width along 6.5 km (4 mi) of Segment 4, where the forest adjoins the road. In the proposed action, the roadway and clear zone within the forested portion of the project area will be about 14-17 m (50-60 ft). Construction disturbances will result in a clearing width up to 30 m (100 ft). The construction staff will make every effort during construction to vary the forest edge as much as possible to replicate the existing forest edge.

Areas that provide grizzly bear movement corridors and linkage zones will be permanently altered as a result of the proposed project. An increase in habitat fragmentation from the proposed action is unlikely, due in part to low levels of grizzly bear use of habitat near the road,

and close adherence of the proposed road to the existing road corridor. In addition, the FHWA has proposed the following measures to minimize impacts to movement corridors: (1) landscape planting for wildlife crossing areas after construction activities are completed, (2) eliminating parking areas considered detrimental to wildlife crossings from project design, (3) minimizing use of guardrail in wildlife crossing areas and wildlife-permeable guardrail will be used, (4) shifting construction limits to one side of the existing roadway to minimize impacts and avoid impacts to both sides of the road in most locations, (5) minimizing length and height of retaining walls so they do not constitute a barrier to wildlife movement, (6) providing for wildlife crossing at the proposed alignment at Beartooth Ravine (new bridge), and (7) accommodating wildlife movement under all bridges. The avoidance measures planned for the proposed project were designed to minimize impacts to grizzly bear movement. No decrease in grizzly bear movement opportunities, and no associated decrease in reproductive fitness of individual bears with home ranges adjacent to the project area, is anticipated as a result of the proposed project.

Habitat Loss

Implementation of the proposed action will result in changes to grizzly bear foraging habitat. Roadway widening and construction disturbance will temporarily disturb about 18 ha (45 ac) of grizzly bear habitat in MS1 and about 32 ha (79 ac) in MS3. Permanent impacts to grizzly bear habitat will include 2 ha (4 ac) in MS1 and 7 ha (17 ac) in MS3. There will also be the loss of approximately 14 acres of mature, cone-producing whitebark pine potentially resulting in the indirect take on an unquantifiable number of grizzly bears as a result of the loss of feeding habitat. The habitat impacted consists of forest (including whitebark pine), wet meadow, and mountain meadow communities.

The clearing of whitebark pine forest will remove a food source used by grizzly bears. However, whitebark pine forests impacted during project implementation are located in close proximity to the existing road. Because whitebark pine grows slowly and does not produce seed crops used by grizzly bears for up to 80 years, all impacts to whitebark pine as a result of the proposed project are considered permanent. The proposed action will permanently impact 5 ha (14 ac) of whitebark pine. It is unlikely that the loss of whitebark pine forest will substantially reduce food source availability in the late summer and fall. Some of the affected whitebark pine forest in the project area is located in rocky subalpine habitat (and in MS3) where seed production and habitat value are low. Wet meadow and mountain meadow communities, which provide herbaceous forage for the bear, also will be affected as a result of the proposed project. Wet meadows are comprised of wetlands and their associated riparian areas. About 3 ha (7 ac) of wet meadow habitat will be impacted permanently.

Except during the late hyperphagia season, nearly all disturbed areas have low habitat effectiveness. There are no areas of high habitat effectiveness in the project area during the spring, estrus, or early hyperphagia seasons. During those same seasons, less than 2 ha (4 ac) with existing medium habitat effectiveness will be impacted. About 50 percent (5 ha [11 ac]) of the disturbed area has low habitat effectiveness during the late hyperphagia season. The remaining disturbed area has either medium (3 ha [6 ac]) or high (2 ha [4 ac]) habitat effectiveness during late hyperphagia.

No known denning areas occur in the project area. The FHWA has minimized impacts of the proposed project to grizzly bear habitat during project design as follows: (1) re-vegetating habitat areas that are disturbed by construction activities, (2) minimizing paved roadway width during

design, and (3) constructing parking lots in existing disturbed areas, and/or eliminated in sensitive areas, to minimize impacts. The avoidance measures planned for the proposed project were designed to minimize impacts to grizzly bear habitat.

Temporary Construction Displacement
Grizzly bears may be temporarily displaced from foraging habitat by the noise and disturbance associated with construction activities. Construction will occur throughout the day during the construction period from April to November. Grizzly bears in the YGBE are most active in early morning and late evening, often resting during the day. Later in the year as bears enter into hyperphagia, bears remain active longer during the day and increase nighttime foraging.

To minimize construction displacement, nighttime construction activities will be timed to minimize impacts during important foraging periods (particularly late hyperphagia, October 16 to November 30). In addition, the FHWA proposes to implement the following measures as a feature of the proposed project: (1) completing all construction occurring in grizzly bear habitat during Phase I, (2) the FHWA shall allow no night construction work (defined as midnight to 6:00 am) from September 1 to winter shutdown from the project start (KP 39.5) to just after Wildlife Crossing Area 7 (KP 45), (3) nighttime construction activities from the project start (KP 39.5) to just after Wildlife Crossing Area 7 (KP 45) are limited to cleanup of blasting and drilling activities, (4) limiting truck turnarounds to the proposed area of disturbance, and (5) limiting hauling to approximately 200 round trips (truck) per day. The avoidance measures planned for the proposed project were designed to minimize impacts to grizzly bear prey species.

Bear-Human Conflicts
During construction activities, human presence in the project area is anticipated to increase, thus increasing the risk for bear-human conflicts. Grizzly bears typically avoid areas of human activity. Because grizzly bears can be attracted to food, the scent of some petroleum products, and other attractants, facilities such as the workcamp and staging areas would be subject to the workcamp conservation measures. Bears that become habituated to human presence and food sources may become nuisance bears, and be euthanized.

Because the preferred workcamp at the Fox Creek Campground will be constructed within the footprint of the existing campground, there will be no change in grizzly bear habitat value. The workcamp may bring more people in contact with occupied grizzly bear habitat on a daily basis. Up to 80 construction workers are expected to occupy the workcamp on a daily basis throughout the construction season. Implementation of the Grizzly Bear Management and Protection Plan is expected to avoid additional temporary impacts to grizzly bears from the workcamp.

The FHWA has proposed the following measures to be implemented at the Fox Creek Campground workcamp: (1) development and implementation of a Grizzly Bear Management and Protection Plan, (2) training construction workers on safety awareness, conflict avoidance, etc., (3) full-time presence of an on-site manager during construction, and (4) construction and management of a "bear friendly" workcamp in order to minimize conflicts (i.e., bear-proof food storage containers and dumpsters).

Indirect Effects

The proposed action may also indirectly affect grizzly bears. Potential indirect impacts from the proposed project include increased mortality risk from vehicle collisions, increased risk for human-bear conflicts, and temporary (short-term) impacts to prey species.

Risk From Vehicle Collisions

There is a potential for an increase in vehicle-strike, road-kill mortality of grizzly bears associated with the proposed project as a result of increases in vehicle operating speeds due to an improved roadway. A wider road surface, smoother pavement, and smoother curvature will likely result in some increase in average vehicle speeds. Currently, there are no speed limits posted for the project area. Project design will improve sight distances for drivers to avoid grizzly bears and other wildlife. However, improved sight distances may increase driving speeds, negating some of the benefits of the proposed improved sight distance. A substantial increase in grizzly bear mortality from vehicle collisions is unlikely because of low vehicle speeds and relatively low project traffic levels, particularly at dawn and dusk when bears are most active. In addition, the FHWA has proposed the following measures to minimize risk from vehicle collisions: (1) keeping curvature of the existing road to minimize average vehicle speeds, (2) increasing sight distance for driver response, (3) providing shoulders to increase driver maneuverability, (4) adding cautionary signage in wildlife crossing areas, (5) adding advisory speed signs in all identified Wildlife Crossing Areas, (6) adding interpretive signage informing public of animal/vehicle collision risk, and (7) using non-palatable species for re-vegetation to prevent grizzly bears from feeding near the road. Implementation of these measures will minimize, but not eliminate, the increased mortality risk of grizzly bear/vehicle collisions.

Bear-Human Conflicts

The improved highway is expected to attract increased numbers of visitors to the project area, thus increasing the risk for bear-human conflicts. Following reconstruction, the proposed parking areas and pullouts will be the areas of concentrated visitor activity. Three of the ten parking areas will be within the Recovery Zone, one in MS3 and two in MS1. The remaining seven parking areas will be outside of the Recovery Zone. The overall number of pullouts will decrease and there would be greater distances between pullouts, resulting in visitor activity and concentration will be focused in fewer areas. In addition, the new pullouts will include educational information about grizzly bear activities in the area, and will also have only "bear friendly" facilities installed.

Impacts To Prey Species

The proposed project will result in a loss of ungulate foraging habitat. Grizzly bears often prey on available and vulnerable ungulates. The project area provides spring, summer, and fall range for elk, mule deer, and moose (WGFD 1998). These ungulates do not provide a primary source of carrion for grizzly bear in the spring. Minimization measures implemented for the grizzly bear and other predatory species also will reduce impacts on prey species. These measures will minimize vehicle collision risk, impacts to movement corridors, and habitat loss to prey species for the grizzly bear.

Canada lynx

Direct Effects

Direct effects to Canada lynx from the proposed project likely will be similar to grizzly bear impacts. Those direct effects are increased risk of habitat fragmentation and direct habitat loss.

Habitat Fragmentation and Movement Corridors

The proposed action will increase the width of the paved surface and vegetation clearing on cut and fill slopes, thus potentially increasing habitat fragmentation. Road widening and the removal of forest cover adjacent to the road will increase the travel distance for Canada lynx movement across open terrain. The typical width of the new road opening (approximately 14 to 17 m [50 to 60 ft]) will be less than the typical maximum lynx crossing distance for open terrain of 90 m (300 ft) (Koehler 1990), but may possibly affect lynx behavior or willingness to cross the road. Application of special landscape treatments at wildlife crossing areas is expected to eliminate most habitat connectivity impacts.

The use of guardrail will not create a barrier to Canada lynx movement. Guardrail proposed for the project have a 0.6 m (1.8 ft) gap between the ground surface and the railing, which will allow lynx movement under the railing. Because construction will cease and the road would remain closed to traffic during the winter, there will be no new impact to lynx connectivity during November to April. Continued winter recreational activity along the road will be similar to current conditions, and will continue to affect lynx movement. In summary, the connectivity of suitable lynx habitat north and south of the road will not change substantially. Most of the traffic will continue to occur during daylight hours when lynx are less active. No decrease in lynx reproductive fitness is expected as a result of changes in connectivity from the proposed project.

Habitat Loss

The area west of the Top of the World store is a key linkage area for the Canada lynx and provides suitable habitat for both the lynx and its prey (USFS 2000b). In addition to the key linkage area, other areas within LAUs provide suitable habitat for the lynx. LAU mapping included all spruce/fir habitat on the SNF. The proposed action will permanently impact about 5 ha (12 ac) of habitat within LAU 1 and 6 ha (14 ac) of habitat within LAU 2. About 2 ha (5 ac) of the lynx potential key linkage area will be affected within LAU 2. No suitable lynx denning habitat will be affected. Habitat loss likely will not have a significant impact on the lynx, because the existing road is likely to minimize use of the adjoining habitat. Habitat avoidance and minimization techniques described previously for the grizzly bear also will benefit the lynx. No decrease in lynx reproductive fitness is expected as a result of changes to habitat from the proposed project.

Indirect Effects

Indirect effects to Canada lynx from the proposed project likely will be similar to grizzly bear impacts. Those indirect effects are increased mortality from animal-vehicle collisions and impacts to prey species.

Risk from Vehicle Collisions
Increased traffic speed due to surface improvements and increased visibility, may result in increased mortality risk to the lynx. Measures to minimize the risk of animal-vehicle collisions discussed in the Grizzly Bear section will also minimize impacts to the lynx. No increase in lynx mortality risk from animal-vehicle collisions is expected as a result of the proposed project.

Impacts to Prey Species
In the project area, Canada lynx prey primarily on snowshoe hare and red squirrel. The project area provides areas of suitable habitat for both these species, and the proposed project will result in a minor loss of habitat for prey species. Hare and red squirrel also are at risk for vehicle collisions. These impacts may have a minor impact on the prey base for the lynx, but should result in no overall impact to the lynx

Interrelated and Interdependent Effects
Interrelated actions are activities that are part of the proposed project and depend on the proposed project for their justification. Interdependent activities are activities that have no independent utility apart from the proposed project. Future Federal actions that are unrelated to the proposed action are not considered in this Biological Opinion because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any interrelated or interdependent actions associated with roadway rehabilitation activities along Segment 4 of the Beartooth Highway.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

At the level of the GYA, two major trends impact wildlife habitat and distribution. The sources of potential cumulative effect include: (1) road construction and reconstruction trends, and (2) future area growth. Many roads within the GYA are being paved or reconstructed. YNP is in the process of implementing a 20-year parkwide road reconstruction plan to improve the Park's 330-mile road system. Segment 1 of U.S. 212, from the northeast entrance to YNP east to the Montana/Wyoming state line near Colter Pass, is proposed for reconstruction from 2004 to 2007. Reconstruction recently was completed on the North Fork Road from the East Entrance to YNP east to Cody, Wyoming. Reconstruction activities generally lead to a wider roadway and clear zone width and improved road surface, which may increase vehicle speeds. These changes make roads less permeable to wildlife, thereby impacting habitat connectivity. In addition, increased vehicle speeds increase the risk of vehicle collisions.

The population of communities and counties around the project area has grown about 1 percent annually over the past 10 years (Census Bureau 2001). The human populations within the GYA have grown much more. Population growth impacts wildlife populations in several ways, most importantly by directly impacting and fragmenting habitat with new development, and by increasing traffic volumes on area roads. Increased traffic volumes are a primary impetus for reconstructing and improving roadways.

CONCLUSION

After reviewing the current status of the grizzly bear and the Canada lynx; the environmental baseline for the action area; the effects of the proposed reconstruction actions on Segment 4 of the Beartooth Highway; and the cumulative effects, it is the Service's Biological Opinion that the reconstruction actions on Segment 4 of the Beartooth Highway, as proposed, are not likely to jeopardize the continued existence of the grizzly bear or the Canada lynx. No critical habitat has been designated for these species, therefore, none will be affected.

When concluding that the project, as proposed, will not likely jeopardize the continued existence of the grizzly bear and the Canada lynx, the Service also considered the following:

- The grizzly bear has experienced significant recovery and has met its recovery zone goals in the YGBE;
- The project area encompasses a relatively small amount of the grizzly bear's and Canada lynx's entire range in the GYA;
- Impacts to suitable Canada lynx habitat as a result of the proposed project would be insignificant or discountable; and,
- Canada lynx are considered very uncommon in the proposed project area. In addition, Canada lynx are unlikely to forage in the project area, because preliminary data suggest that mature lodgepole pine and whitebark pine stands along Segment 4 support few snowshoe hares.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, foraging, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the FHWA so that they become binding conditions of final design, any grant, permit, or contract issued by the FHWA, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require any contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms

that are added to the permit, grant, or contract document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impacts of the incidental take, the FHWA must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

AMOUNT OR EXTENT OF TAKE

Grizzly Bear

The Service anticipates 1 grizzly bear (adult or juvenile) could be taken as a result of the proposed action. The incidental take is expected to be a mortality in the form of a vehicle collision. Additionally, the Service anticipates non-lethal take, such as harm or harassment resulting from displacement of grizzly bears from important habitats, will continue to occur as a result of increased vehicle numbers and speed on this highway. However, the best scientific and commercial data available are not sufficient to enable the Service to quantify a specific amount of non-lethal incidental take for the proposed action. The effects of the proposed action are largely unquantifiable in the short term and may be measurable only as long-term effects on the species habitat and population levels. Without additional information and analyses that are currently unavailable, the Service must designate the anticipated level of non-lethal incidental take for the proposed road construction as unquantifiable.

The proposed widening of the road and additional shoulders are expected to increase vehicle speed in most locations, even though speed limits will remain the same or decrease. Even with the slight anticipated increase in average vehicle speeds, speeds are not expected to exceed the currently accepted risk level for forest carnivores. Wider clear zones may provide for greater visibility and decreased collisions with wildlife. However, because vehicle speed is expected to increase, and research has not proved that increased clearing zones and visibility (with an increase in speed) reduce vehicle collisions with wildlife, it is anticipated that the potential for a grizzly bear mortality due to vehicle collisions may slightly increase due to the proposed project. In addition, the current increases in YGBE populations further increases this potential due to the number of bears in the area, including bears crossing the road to establish home ranges in previously unoccupied areas.

To date, there have been no reported deaths of grizzly bears due to vehicle collisions on this section of Segment 4, although it is possible that other unrecorded lethal or non-lethal collisions have occurred between grizzly bears and highway vehicles. Therefore, based upon the potential for increased take due to increasing populations, increased operating speeds, and numbers of vehicles, the Service anticipates that the potential for a take of one bear exists. There will also be the loss of approximately 14 acres of mature, cone-producing whitebark pine potentially resulting in the indirect take on an unquantifiable number of grizzly bears as a result of the loss of feeding habitat. This incidental take will be in the form of harm or harassment as a consequence of mature whitebark pine trees being removed during the Segment 4 reconstruction.

Canada lynx

No incidental take is anticipated.

EFFECT OF THE TAKE

Grizzly Bear

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the continued existence of the grizzly bear or destruction or adverse modification of critical habitat.

Canada lynx

Since no incidental take is anticipated, take will not affect the Canada lynx.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take on the grizzly bear:

1. The FHWA shall insure direct habitat disturbance does not exceed that discussed in the June 2003 Biological Assessment and evaluated in this Biological Opinion. Through minimization and monitoring of direct habitat disturbance, indirect disturbance to the grizzly bear will also be minimized;

2. Roadside vegetation shall be managed in a manner that will facilitate safe crossing of the highway by grizzly bears;

3. The potential for grizzly bears to feed on road-killed wildlife carcasses shall be minimized;

4. Human access to important grizzly bear use areas shall be minimized during construction;

5. Habituation of grizzly bears and human/bear conflicts shall be minimized during construction;

6. All contractors, employees, staff, volunteers, and workers will be informed and educated on the presence of the grizzly bear in the project area; and,

7. Users of Segment 4 of the Beartooth Highway shall be educated as to the occurrence of grizzly bears in that corridor, and the need for heightened awareness of bears and other wildlife as the highway is traveled.

Canada Lynx

Since no incidental take is anticipated, no reasonable and prudent measures are necessary.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Grizzly Bear

1. The FHWA shall implement all Conservation Measures (CMs) identified in the June 2003 Biological Assessment prepared for the proposed project. These measures are listed under the Project Description section of this Biological Opinion and summarized in Attachment A.

2. In the unlikely event that a grizzly bear (alive, dead, injured, or hibernating) is located during construction activities within the project area, the FHWA shall notify the Service's Wyoming Field Office (307-772-2374) and the Service's Law Enforcement Office (307-261-6365) within 24 hours. The FHWA shall notify and consult with SNF biologists regarding work stoppage and site specific use restrictions (e.g., removal of carrion from activity area, flaggers removed from area, etc.).

3. The FHWA shall insure carrion is removed from Phase I (Station 39+400 to Station 52+400) of Segment 4 of the Beartooth Highway corridor prior to opening of the road in the spring and thereafter as soon as any carrion the size of a marmot (*Marmota* sp.) or larger is discovered during construction activities. The FHWA shall develop and implement a system for monitoring carcasses in conjunction with the SNF. The FHWA shall implement this monitoring program beginning with the initial opening of Segment 4 of the Beartooth Highway each spring and terminate when the road is closed in the fall during project construction. The FHWA's responsibilities to remove carrion will cease upon completion of Segment 4 reconstruction.

4. Where trees or other woody vegetation must be cleared along the road edge at the seven identified Wildlife Crossing Areas, FHWA shall design an irregular forest edge and preserve as many large trees, including Whitebark pine, on the edge of the disturbed area as possible in order to facilitate grizzly bear road crossings.

5. To facilitate early identification of potential increases in incidental take and evaluation of the adequacy of existing mechanisms to minimize incidental take of grizzly bears associated with Segment 4 of the Beartooth Highway, the FHWA shall immediately consult informally with the Service should the level of incidental take meet, but not exceed, the anticipated level of incidental take during the course of reconstruction of Segment 4.

6. To minimize displacement of grizzly bears, the proposed project shall avoid construction activities in certain areas during seasonally high concentrations of bear activity. The FHWA shall allow no night construction work (defined as from midnight to 6:00 am) after September 1 to the winter shut down of the road, from the Project Start (KP 39.5) to after Wildlife Crossing No. 7 (KP 45), and including the Ghost Creek Materials source site. This night closure is planned to reduce the displacement of bears feeding on whitebark pine seed middens during nocturnal forays.

7. The FHWA shall not allow employee or contractors camps on public lands outside the Fox Creek work camp. The FHWA shall assign or fund personnel, as necessary, to monitor compliance with the SNF's Grizzly Bear Management and Protection Plan.

8. During the course of construction of Segment 4 of the Beartooth Highway, the FHWA shall monitor vegetation changes resulting from ground disturbances and develop a plan to remove exotic forbs in the disturbed construction areas of Phase I (Station 39+400 to Station 52+400). Of special concern is the exotic clover (*Trifolium hybridum*) that is highly preferred by foraging grizzly bears. The FHWA shall use the best available scientific-based technology (e.g., USDA plants database, SNF botanists, etc.) to attempt to prevent this species of clover from growing in the post-construction, disturbed ground.

9. The FHWA shall insure that all areas disturbed by construction activities in Phase I (Station 39+400 to Station 52+400) are re-seeded and re-vegetated immediately upon post-disturbance. In accordance with National Pollutant Discharge Elimination System (NPDES) permit requirements (70 percent vegetation cover success criteria), these areas shall be monitored to document re-vegetation success and to determine future planting treatments.

10. The FHWA shall evaluate any new information provided by the Service regarding the effects of the project on the grizzly bear for incorporation into the final design phase of the proposed project.

11. For the proposed project, all construction plan issuances will be coordinated with the Service as they are developed, to insure that impacts are minimized to the extent possible prior to construction. Coordination will include the continuation of attendance of meetings, as necessary, and upon the receipt of (all draft and final) plans as they are developed.

12. To monitor the impacts of the proposed project, the FHWA shall prepare a report describing the progress of the proposed action (plan design, issuance, project implementation and construction activities), including implementation of the associated reasonable and prudent measures, and impacts to the grizzly bear (50 CFR §402.14[i][3]) during the course of construction. The report, which shall be submitted to the Service's Wyoming Field Office by January 1 annually, for work done in the previous fiscal year starting January 1, 2005, shall list and describe:

    - progress of plan issuances, design, and project activities,
    - adverse effects resulting from project activities,
    - when and if the level of anticipated incidental take is approached,
    - when and if the level of anticipated take is exceeded, and
    - results of annual, periodic monitoring which evaluates the effectiveness of the reasonable and prudent measures. Include items such as: an assessment of whether project implementation is consistent with that described in the June 2003 Biological Assessment; compliance with terms and conditions; and documentation of sightings of listed species during project activities.

    Upon receipt of the FHWA annual report, the Service shall, within 30 days, provide written documentation of their agreement of the accuracy of the report findings or identify the cause and resultant effect, on the grizzly bear, of project activities that have been found in conflict or out of compliance with the reasonable and prudent measures and their implementing terms and conditions.

13. The FHWA shall develop a Memorandum of Agreement in conjunction with the Service, SNF, NPS, and other agencies as necessary in order to accomplish those long-term and individual agency commitments identified in Attachment B of this Biological Opinion after construction activities are completed.

Canada Lynx
Since no incidental take is anticipated for the Canada lynx, no terms and conditions are necessary.

The above listed reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of this action, construction and continued operation of Segment 4 of the Beartooth Highway, this level of incidental take is exceeded (1 grizzly bear adult or juvenile), such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends implementation of the following conservation recommendations:

1. New innovative strategies for managing people and habituated bears at bear-jams need to be developed to reduce the potential for bear-human conflicts with, and human-caused mortality of, habituated grizzly bears that frequent road corridors in the National Forest.

2. Research funding should be sought for: (a) interpretive displays and long-term management of grizzly bear-jams on this road segment in order to minimize the negative impacts of the road on grizzly bears, (b) studying the changes in grizzly bear foraging behavior, movement and home ranges during the course of the construction activity and post-construction for up to 2 years, (c) studying existing vehicular speeds on this road segment as well as any changes in vehicular speeds that result from the proposed road improvements, and (d) monitoring grizzly bear movements in the project area by using Global Positioning System collars on bears with home ranges in or adjacent to the project area. These data will provide valuable information on the effects of large construction projects on the movements and behavior of grizzly bears.

3. Seedling and/or mature whitebark pines should be planted in old road scars where appropriate to facilitate the re-vegetation of this area.

4. Important grizzly bear habitat components such as riparian areas, travel corridors, drainages, and berry stands should be avoided during site disturbance.

5. Travel lanes should be reduced to single width during construction to reduce construction clearing zones. Incorporate the use of pilot cars, lights, and or flag persons as needed.

6. Construction activities should be avoided during grizzly bear peak seasonal or daily use hours to allow bear use of existing habitat near the road and/or allow for less disturbance to bears crossing the road within the project area.

7. Construction activities should be consolidated to reduce disturbance or displacement impacts to bears using the area.

In order for the Service to be kept informed of actions minimizing or avoiding adverse affects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the June 2003 Biological Assessment for Segment 4 of the Beartooth Highway. As provided in 50 CFR §402.14, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount of extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your efforts to insure the conservation of endangered, threatened, and candidate species. If you have questions regarding this Biological Opinion or your responsibilities under the Act, please contact Melissia Carter of my staff at the letterhead address or phone (307) 772-2374, extension 29.

Sincerely,

Brian T. Kelly
Field Supervisor
Wyoming Field Office

cc: NPS, Yellowstone National Park, WY (Project Manager)
USFS, Shoshone National Forest, Cody, WY (Project Manager)
USFWS, Section 7 Regional Coordinator - Ecological Services, Denver, CO
USFWS, Region 6 Transportation Coordinator, Denver, CO (C. Dubovsky)
WDEQ, Water Quality Division, Cheyenne, WY (Project Manager)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (T. Collins)
WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)

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ATTACHMENT A

CONSERVATION MEASURES

CM1: The design speed of the reconstructed roadway (37 mph or less) will be lower than the forest predator threshold of 45 mph as indicated by Gunther et al. 1998;

CM2: Cautionary signage will be installed in all wildlife crossing areas;

CM3: Advisory speed signage will be posted along the roadway within the identified Wildlife Crossing Areas;

CM4: Interpretive signage will be installed along the roadway to inform the public of potential for animal/vehicle collisions;

CM5: The use of guardrail will be minimized by flattening of slopes, use of gaps in guardrail, and by the use of wildlife-permeable guardrail at wildlife crossings;

CM6: The length and height of retaining walls will be minimized so they do not constitute a barrier to wildlife movement;

CM7: All bridges will be designed to accommodate wildlife movements;

CM8 : Roadway widths and shoulders will be minimized;

CM9 : Any new parking or pullout areas will be few in total number compared to the existing condition of Segment 4. Within the identified Wildlife Crossing Areas any new parking or pullout areas will be located to minimize and reduce impacts to wildlife;

CM10: Construction activities will occur in scheduled phases;

CM11: Timing limitations will be implemented on hauling and blasting activities in sensitive areas;

CM12: All construction occurring in grizzly bear habitat will be completed during the first scheduled construction phase;

CM13: Nighttime construction activities from the project start (KP 39.5) to just after Wildlife Crossing Area 7 (KP 45) will be limited to cleanup of blasting and drilling activities with minor hauling;

CM14: No nighttime construction activities will be allowed from midnight to 6:00 am after September 1 to winter shutdown of the road from the project start (KP 39.5) to just after Wildlife Crossing Area 7 (KP 45) to avoid impacts to feeding bears;

CM15: A Grizzly Bear Management and Protection Plan would be developed and implemented to address facilities (e.g., workcamps, staging areas, gravel pit areas, construction areas), actions, guidelines, and procedures to assure compliance with regulations and best management practices in order to prevent human/bear conflicts and to minimize injuries if involved in an encounter with a bear;

CM16: The contractor, his/her agents, employees, and subcontractors will comply with the requirements of the Grizzly Bear Management and Protection Plan in the conduct of any and all activities authorized;

CM17: The contractor's full cooperation in meeting grizzly bear management goals and objectives will be a condition to receiving authorization to operate;

CM18: All construction employees working on-site will be given safety awareness training that includes the following subjects: protected status of the grizzly bear, grizzly bear behavior, proper (human) behavior in bear country, proper attractant storage, conflict avoidance/prevention, assessment of risks/probabilities, encounter procedures, and use of bear repellant spray;

CM19: Bear-proof food storage boxes and sheds would be built to accommodate storage of foods, coolers, barbeques, and any other potential bear attractants. Bear-proof garbage cans and dumpsters will be provided to insure that no attractants be available to bears and other wildlife. These containers would be emptied on a daily basis;

CM20: No long-term food storage or storage in open containers will be allowed;

CM21: Project employees will be prevented from carrying firearms or bringing pets to the workcamp;

CM22: Grizzly bear sightings will be reported to the U.S. Forest Service employee in charge and the Wyoming Game and Fish Department;

CM23: The workcamp will be constructed with "bear friendly" design. This includes a design that tightly spaces the camp in a "pod" configuration with no loops or rows that are not in a centrally constructed design, with each pod having a centrally located common area for picnic tables and a post-mounted grill, and insuring that no sites have individual picnic and campfire features; and,

CM24: In the event of a human/bear conflict, or in order to avoid an imminent potential conflict, the U.S. Forest Service employee in charge may order an immediate temporary cessation of all project activity in the immediate area of the conflict or potential conflict is such is needed. The contractor shall immediately comply with such action. Such cessation will be in effect until such time as the appropriate authorities have been contacted and any risks to humans and bears have been successfully resolved in accordance with the Interagency Grizzly Bear Guidelines.

ATTACHMENT B

TERMS AND CONDITIONS
LONG-TERM AGENCY COMMITMENTS

Grizzly Bear

1. In the unlikely event that a grizzly bear (dead or injured) is located along Segment 4 after construction activities are completed, the Service's Wyoming Field Office (307-772-2374) and the Service's Law Enforcement Office (307-261-6365) shall be notified within 24 hours.

2. After construction activities are complete, large carrion shall be removed from Segment 4 of the Beartooth Highway corridor prior to opening of the road in the spring and thereafter as soon as large carrion is discovered.

3. To facilitate early identification of potential increases in incidental take and evaluation of the adequacy of existing mechanisms to minimize incidental take of grizzly bears associated with Segment 4 of the Beartooth Highway after construction activities are complete, the lead Federal agency shall immediately consult informally with the Service should the level of incidental take meet, but not exceed, the anticipated level of incidental take.

4. After construction activities are complete, the SNF shall monitor vegetation changes resulting from ground disturbance and develop a plan to remove exotic forbs in the disturbed post-construction areas. Of special concern is the exotic clover (*Trifolium hybridum*) that is highly preferred by foraging grizzly bears. The SNF in conjunction with the NPS shall use the best available technology to attempt to prevent this species of clover from growing in the post-construction, disturbed ground for a period of no less than 5 consecutive years.

5. After construction activities are complete, areas disturbed by construction activities shall be monitored to document re-vegetation success and to determine future planting treatments as long as the NPDES permit for the project is in effect.

6. To monitor the impacts of post construction activities, the lead Federal agency shall prepare a report describing the progress of the re-vegetation and reclamation actions, including implementation of the associated reasonable and prudent measures, and impacts to the grizzly bear (50 CFR §402.14[i][3]). This monitoring shall continue as long as the NPDES permit for the project is in effect. The report, which shall be submitted to the Service's Wyoming Field Office by January 1 annually, for the previous fiscal year starting the year after construction activities are complete, shall list and describe:

    - progress of re-vegetation, re-seeding, and reclamation activities,
    - adverse effects resulting from post-project activities,
    - when and if the level of anticipated incidental take is approached,
    - when and if the level of anticipated incidental take is exceeded, and

- results of annual, periodic monitoring which evaluates the effectiveness of the reasonable and prudent measures. Include items such as: an assessment of whether post-project activities are consistent with that described in the FHWA's June 2003 Biological Assessment; compliance with long-term terms and conditions; and documentation of sightings of listed species during post-construction activities.

Upon receipt of the annual report, the Service shall, within 30 days, provide written documentation of their agreement of the accuracy of the report findings or identify the cause and resultant effect, on the grizzly bear, of post-project activities that have been found in conflict or out of compliance with the reasonable and prudent measures and their implementing terms and conditions.

Canada Lynx

Since no incidental take is anticipated for the Canada lynx, no long-term terms and conditions are necessary.